

## Chapter 3. Desired Future Conditions and Planned Management

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### Introduction

The desired future conditions for JDSF evolve out of the Goals and Objectives presented in Chapter 1. The Goals and Objectives call for a management focus of research and demonstration (Goal #1), built on a foundation of forest restoration (Goal #2), and promotion of watershed and ecological processes (Goal #3). Timber management (Goal #4) is one of the key means to achieving the first three goals. For example, research and demonstration on timber management is an explicit requirement of the Public Resources Code establishing the Demonstration State Forests (PRC §4631), while at the same time it is an important tool for more quickly achieving the development of desired older forest structure and developing a wide range of forest stand conditions that provide a wide range of research opportunities at the same time as offering a diverse range of wildlife habitat. This chapter also addresses future conditions and planned management measures recreation and aesthetic enjoyment goal of the Forest (Goal #5), which is very important to a broad range of the public. Also addressed here are desired conditions and the management for information planning and staffing (Goal #6); forest protection (Goal #7); minor forest products (Goal #8); and property configuration (Goal # 9).

This chapter discusses at length the desired forest conditions for JDSF that evolve out of the Goals and Objectives, as well as the body of statutes and Board policies that underlay the Goals and Objectives. The chapter presents the specific desired future conditions and the measures that will be applied to achieve them. Some of these are very broad (e.g., ecosystem management approach) others are very specific (e.g., hillslope stability and assessment techniques), while others are in between (e.g., forest structure goals).

This chapter provides critical direction for how the Forest will be managed and will be a central source of general and specific guidance. Additional critical management direction is found in Appendix X, which compiles the mitigations that the December 2005 DEIR identified as being needed to address potential significant environmental impacts, as well as the Additional Management Measures that were developed during the EIR process. Chapter 5, Monitoring and Adaptive Management, is an important complement to the current chapter, since it outlines how forest management outcomes are monitored, compared to desired outcomes, and how management will be modified if the desired outcomes are not being achieved.

### JDSF's Ecosystem Management Approach

Management of forest resources on JDSF for long-term environmental and economic sustainability is accomplished under an ecosystem management framework. Ecosystem management is driven by explicitly formulated goals and it is made adaptable by incorporating feedback from monitoring and research to improve understanding of the processes and interactions necessary to sustain ecosystem composition, structure, and function (Christensen et al 1996).

The ecosystem management process used to develop the JDSF Management Plan incorporates concepts of both input and output management (Montgomery 1995). An understanding of how land use activities affect natural processes (e.g., mass wasting, surface erosion, routing of sediment and water, tree mortality and blowdown) and inputs to terrestrial and aquatic

ecosystems (e.g., the flow of energy, nutrients, large woody debris, sediment, and water from hillslope areas to the stream) is critical to developing a *preventative* (or input-oriented) management strategy to avoid significant adverse impacts before they occur. Such an understanding is also critical to predicting the output of valuable resources (e.g., fish, wildlife, habitat, timber, aesthetic values) from these ecosystems. Because ecosystems are complex, our understanding of these systems will never be complete. To help correct for this, a monitoring and adaptive management feedback loop is critical to facilitate a more *reactive* (or output-oriented) management strategy to recognize and mitigate for adverse impacts where they have the potential to occur. Chapter 5, Monitoring and Adaptive Management, describes the application of this process on JDSF.

The application of natural disturbance regimes will be considered during development of silvicultural prescriptions for individual stand management. Mitchell, et al. (2003) provide the following three guidelines.

- Incorporating the concept of legacies into harvesting prescriptions, such as:
  - Structural legacies (e.g., trees, snags, logs, and uproots);
  - Compositional legacies (e.g., seed and seedling banks, trees, shrubs, and herbs representing different species or functional capabilities);
  - Physical legacies (e.g. mineral soil seedbeds or opening sizes);
- Incorporating natural stand development processes, including small-scale disturbances, into silvicultural treatments of established stands, such as:
  - Variability density thinning; decadence creation; and prescribed burning;
- Allowing for appropriate recovery periods between regeneration harvests whether in stand, gap, or individual tree replacement forest types.

#### Habitat Connectivity and Fragmentation

Geographical differences in species response to habitat loss and fragmentation (the process of reducing size and connectivity of stands that compose a forest and leading to population subdivision) and influence on ecosystem function are relatively recent findings. Uncertainty exists concerning differences in species response to disturbance regimes. For example, it is not well known whether forest types that have developed with infrequent disturbance events (e.g. fire, insect or disease damage) have a different response to fragmentation than other forest types. In addition, it is not well known whether spatial arrangement of habitat is less important than total amount. Examining the concept of habitat fragmentation, connectivity and edge effects as a product of forest management in the redwood forest type, is a research and demonstration topic particularly well suited to Jackson Demonstration State Forest.

Connectivity is a species specific habitat characteristic that exists when individuals of a species can move freely among patches of habitat and for greater distances than if that habitat characteristic was not present. Wildlife managers currently hypothesize that connectivity across patches of habitat reduces the likelihood of local extinction and maintains biological diversity (species richness) when the intervening area (the matrix) is hostile to both survival and movement. Connectivity may be maintained by retaining habitat in corridors similar to that of the patches they connect or by maintaining habitat quality suitable for movement in the intervening matrix. Little empirical evidence currently exists to support or refute the concept of corridors in forested environments and is an additional area of potential research and demonstration at JDSF. Maintaining connectivity within the matrix is likely an equally challenging prospect but may have the advantage of less operational difficulty and reduced costs (Bunnell 1999). Assessment of the benefits of landscape connectivity requires information on species movement, response to patch structure, gap crossing ability and dispersal distance. Basic information such as this is generally unavailable for most vertebrate species and is also a research priority.

Efforts to maintain the entire array of biological diversity as it is currently known will include a blend of even and uneven-aged management, long rotations and reserves and the maintenance as well as creation of older forest structure and late seral forest attributes in managed stands. Providing habitat for those species that associate with early-seral stages of forest development is not currently a land management or resource allocation challenge. Given the legacy of historic management practices, the maintenance and development of habitat for those species associated with late seral or old-growth forest conditions and habitat elements requires the greatest level of attention and management creativity. A range of forest habitat conditions from existing old growth groves to openings dominated by grasses, shrubs and small trees to mature forests with larger trees, snags and down logs, and a diversity of tree sizes will be maintained across the forest. This broad range of conditions will serve both habitat diversity and the need for a diversity of stand conditions to meet the needs of researchers.

This plan will implement two major efforts in habitat connectivity. The first will utilize riparian buffers managed for the development of late seral forest, which are well distributed throughout the forest. We hypothesize that this will allow aquatic and some upland species to successfully disperse and take advantage of existing or new high quality habitat. The second approach is to link reserve and high quality habitat areas with viable corridors. Specifically, we will link old growth groves and late seral development areas with a corridor of older forest structure. Additionally, a late seral development area managed to create murrelet habitat will be linked to the Mendocino Woodlands special treatment area, the Woodlands and Big River state park areas, and Russian Gulch State Park. These corridors will encompass an east-west and north-south gradient. Hilty, et al. (Hilty, Lidicker Jr. et al. 2006) provide guidelines for identifying, prioritizing and assessing corridors. Corridor designation is based on already identified habitat to be linked, which was based on current conditions and species of concern habitat requirements. The assessment of the efficacy of the corridors will be done by researchers over time. Guidelines for consideration of indicator taxa are provided by the authors in Table 3.1.

### Scales of Landscape Planning

JDSF does not utilize a single approach to management, but rather applies landscape planning concepts at varying scales depending on each individual management situation. Managing the forest to produce a variety of forest stand types in a landscape context will produce a variety of benefits including the maintenance of biological diversity, management options, and research and demonstration opportunity. The following discussion, along with Table 3.1, provides an overview of some of the issues that are addressed in management planning at JDSF, at different scales of application. They are described individually in more detail later in this chapter and in Chapters 4 and 5.

#### **Forest Level**

- Manage for a range of stand conditions at the landscape scale.
- Consider the existing landscape in terms of pattern (juxtaposition) composition (patch size, patch area), continuity (e.g. corridors), and possible influence on species movement and habitat requirements.
- Consistent with other management objectives manage forest stands toward late seral or old-growth conditions in those areas showing the greatest likelihood of attaining that condition or where existing late seral or old-growth associated values can be maximized.

**Watershed Level**

- Forest stands will be selected for management after considering the spatial context of the vegetation polygon of which they are a part.
- Manage for a range of habitat patch types, sizes and juxtaposition.
- Develop over time a late seral forest component to conserve and restore late seral and old-growth forests and associated ecosystem processes. This will be composed of existing old-growth groves, old-growth tree aggregations, management areas identified for the development of late seral forest conditions and WLPZs.

**Stand Level**

- Use thinning and selection prescriptions to create a range of stand stocking levels, vertical structural diversity, and horizontal diversity among neighboring stands. Employ thinning and partial cutting prescriptions to create or maintain important structural elements such as snags, down wood, canopy gaps, shrub understory, and multiple crown layers.
- Special habitat element (i.e., snags and down logs) occurrence, recruitment, and protection opportunities will be determined during development of silvicultural prescriptions.
- Provide for hardwood species in sufficient quantity and quality to maintain mast production and special habitat elements.
- Retain important stand components most at risk or difficult to replace. These components include individual trees showing uncommon evidence of wildlife use or old-growth trees with specific characteristics.
- Talus slopes, springs and seeps as well as other habitat elements of geologic origin will be identified and overstory canopy retained to protect microclimate and physical features.
- Where it is not a threat to public safety or forest infrastructure, retain non-catastrophic tree mortality and down wood within late seral development areas, WLPZs, or adjacent (within 100 feet) of old-growth groves. Approach target levels for snags and down logs forest-wide.
- Retain all dead and down wood within the WLPZ where it is not a threat to habitat value or forest infrastructure.
- Employ fire management techniques during prescribed burning to protect habitat elements where feasible.

**Species Level**

- Conduct surveys for selected species.
- Protect nest sites and other areas of importance as described in species accounts.
- Maintain and promote habitat conditions suitable to meet species of concern habitat requisites.

**TABLE 3.1.** JDSF Biotic Resource Considerations at Various Scales of Landscape Planning.

<b>Considerations</b>	<b>Region</b>	<b>Landscape/ Forest Wide</b>	<b>Watershed</b>	<b>Stand</b>	<b>Species</b>
Contribution to populations goals for T&E and Sensitive Species	X	X			
Structural Objectives (including representation of forest succession)		X	X	X	
Patch Size Distribution		X			
Unique Habitats		X	X		
Desired Watershed Stand Structures		X	X		
Riparian Management Strategies (including transportation system)		X	X	X	
Placement of Patch and Stand Structure Types			X		
Isolated Stands			X		
Adjacent Land Uses and Adjacent Watershed Patch Location			X	X	
Edge Extent			X		
Connectivity between Patches		X	X		
Patch Relationships between Aquatic and Upland Management Units			X		
Location of Replacement Stands/Patches		X	X		
Current Stand Condition				X	
Timber Harvesting Plans and Operation Specific Decisions		X	X	X	
Species Activity Sites (osprey nest sites, etc.)				X	X
Structural Components (down wood, layered canopy, snag objectives)			X	X	
Within Stand Diversity (including hardwood & understory, etc.)				X	X
Species Composition				X	X
Survey Requirements					X
Invasive Weed Species Control	X	X	X	X	X
Species Specific Habitat Management				X	X

### Desired Future Forest Structure Conditions

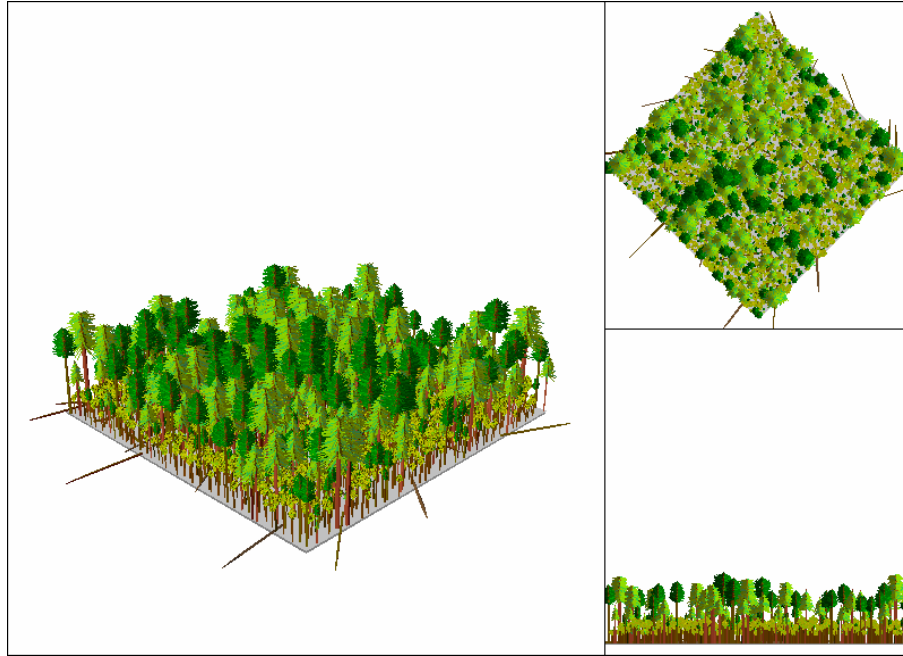
An integral part of the sustainable forestry program of management on JDSF is to achieve a deliberate balance of successional stages on the Forest, from very young to late seral stands and old growth stands, at all times. This goal is specified as a relative distribution of forest structure conditions in Table 3.2. This structural distribution was determined to meet the needs of research and demonstration, as well as achieving a diversity of habitat and forest structures. Table 3.2 represents the desired future forest conditions that will be developed on JDSF. All management actions on JDSF will be planned to make progress toward achieving these forest structure conditions over time. The range of percentages in the table are intended to allow for inherently unpredictable natural events such as fire, and logistical and practical uncertainties associated with planning management of a large forest property over a long period of time.

**Table 3.2.** Desired Future Forest Structure Conditions.

Forest Structure Condition	Percent of Forest Acres
Late Seral or Old-growth	15-25
Older Forest Structure Zone	10-20
Mature and Large Trees	5-15
Mixed Age and Size	30-40
Regeneration and Pole-size Younger Trees	10-20
No Specific Structure Assigned	0-10

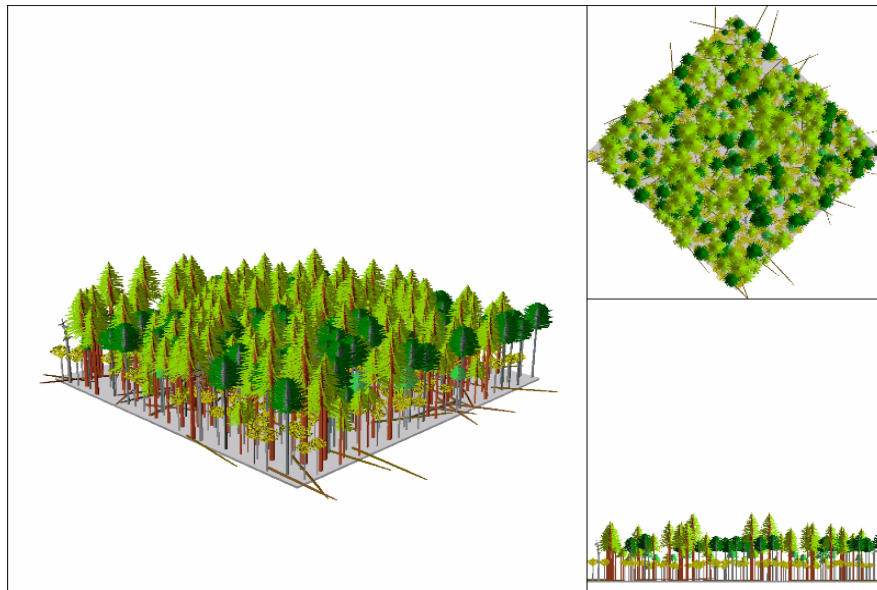
The following graphics are visual examples of actual forest stands on JDSF representative of each of the planned forest structure conditions in Table 3.2:

**Late seral:**

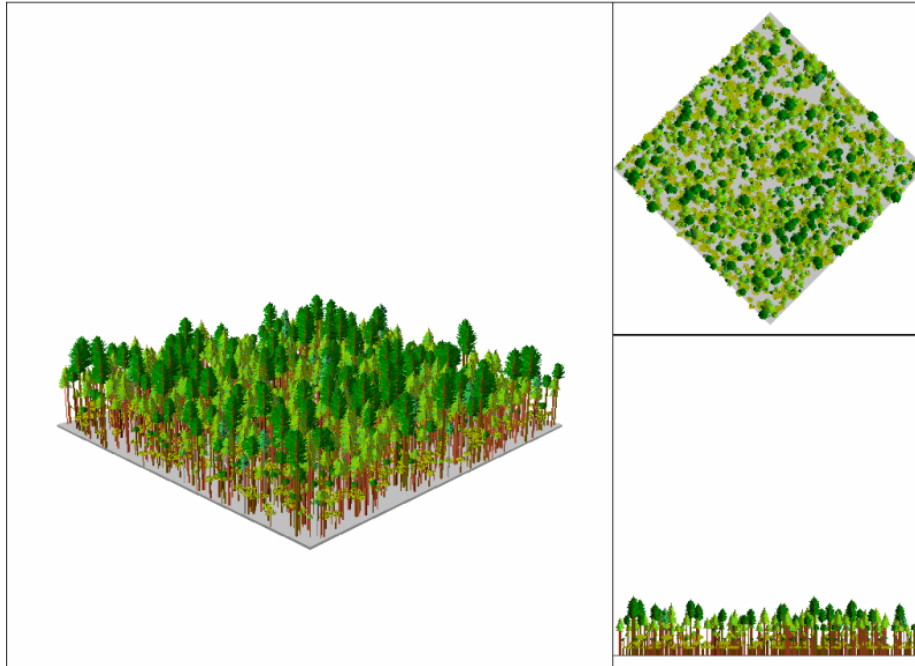


Late seral stands are dominated by large trees and have multiple canopy layers, relatively few trees per acre, and lots of large, down wood.

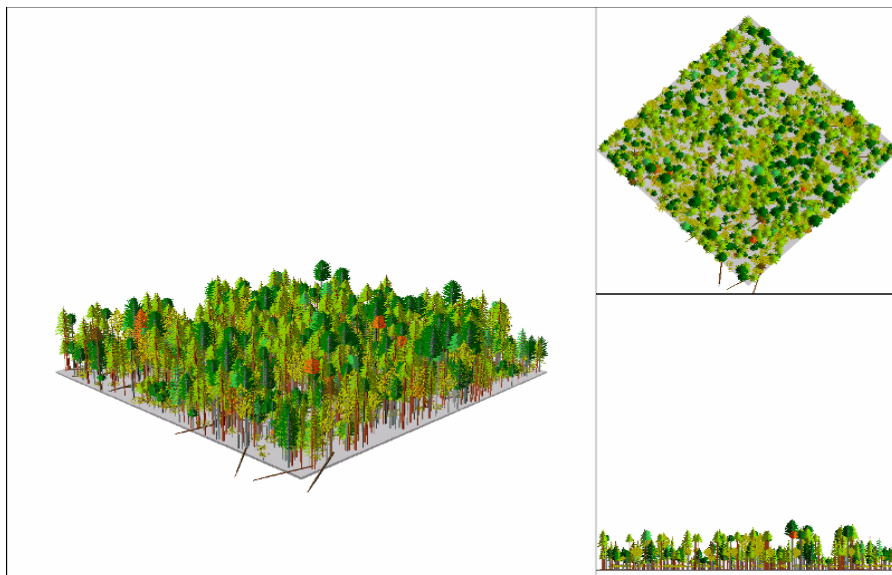
**Older Forest Structure Zone:**



The older forest structure zone, relative to late seral forest, has more trees per acre but still retains multiple canopy layers and substantial numbers of large trees, snags, and downed woody material.

**Mature and Large Trees:**

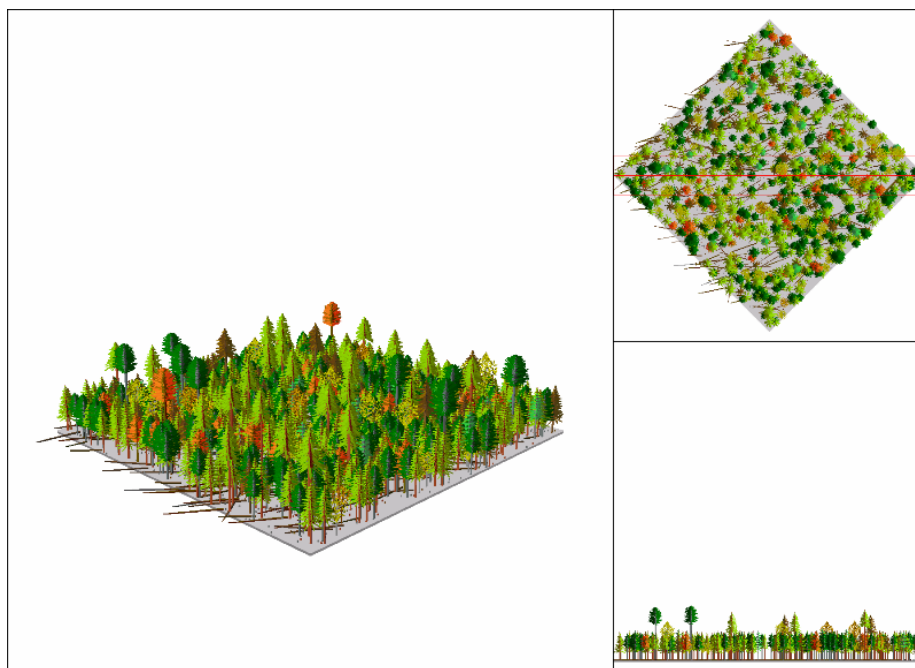
With the mature and large trees stand structure, we still have multiple canopy layers, but there is now a somewhat more open stand structure. There is a clear presence of gaps in the upper canopy that are occupied by clusters of smaller trees. As compared to the previous structure classes, the mature and large trees stands have fewer snags and less large, down wood.

**Mixed Age and Size:**



The mixed age and size stands have a wide range of tree sizes and ages and a larger number of trees per acre than the previous classes. As in the mature and large trees structure class, this structure class also has gaps in the upper canopy, which provide space for thick clusters of regeneration below. There are only moderate amounts of snags and down woody debris present in these stands.

#### Regeneration and Pole-size Younger Trees:



In the regeneration and pole-size younger tree structure class, there is greatly increased homogeneity of tree sizes. There are some dominant trees, but mostly lower canopy codominants. This structure class has the smallest average tree size and the highest number of trees per acre.

The forest structure conditions described above and specified in Table 3.2 will be cultivated through a variety of silvicultural methods, both even-aged and uneven-aged. The stages of regeneration up through late seral can have significant cohorts of different ages and sizes of trees within the stand. The overall appearance and makeup of a stand is what categorizes it into one of the forest structure condition classes above.

One goal of management on JDSF is to maintain the relative proportions of forest structure conditions or successional stages over time. The exception is old growth stands and trees, which will not be harvested. Management may consist of either passive (i.e., foregoing harvest) or active management (typically thinnings) to allow young stands to mature into later successional classes in order to balance the distribution of successional classes to the percentages in the table above. Management to balance the acreages of successional stages across the Forest may also consist of harvesting sufficiently many trees in a stand to reset it to an earlier successional stage. This approach can entail harvesting a sufficient number of trees in a mature stand to reset it to regeneration.

Structural Conditions Related to Late Seral, Watercourse and Lake Protection Zone Areas, and  
Older Forest Structure Zone Area

A significant component of stand management across the forest will be directed toward the creation and maintenance of interconnected older forest structure and older forest habitat. The principal areas within which this will occur are the existing old growth groves, late seral development areas [including the watercourse and lake protection zones (WLPZs)], and the older forest structure zone (OFSZ) (see Figure 5). Each of these areas is organized around the geographic concept that larger units will be more effective than a collection of smaller units that are not connected. The late seral development areas and OFSZ are large contiguous areas designed in large part to provide core areas for wildlife species that prefer unfragmented areas with large trees in the overstory.

Nearly all of the areas designated for late seral development currently are (1) immediately adjacent to core areas such as old growth groves, State Parks, or Class I and II streams WLPZs, (2) dominated by stands with high California Wildlife Habitat Relationship (CWHR) ratings, and (3) will have very little active management to accelerate the development of larger trees or other older forest structures. The WLPZs are a hydrologically linked system that extends from low gradient reaches near the ocean all the way up to intermittent streams in the upper reaches of the watershed. The WLPZ goes through all stand types and management is primarily driven by evolving regulatory requirements as well as research and demonstration projects specifically designed to address riparian forest conditions. Older forests with larger trees and late seral structural characteristics will provide both high levels of canopy to maintain moister, cooler microclimates as well as provide the potential recruitment of large trees that could eventually enter the stream systems and provide some of the instream structure that is critical to salmonid species.

The OFSZ, running west-to-east and north-to-south, connects existing old growth groves and proposed late seral development areas, provides buffers around them that will be managed to expand the groves, and provides a continuous, unfragmented corridor where the dominant management goal will be to accelerate the restoration of structural elements common in older forests. The OFSZ exemplifies the range of conditions across the North Coast region where the maintenance and restoration of older forest structure is the dominant management goal. Unlike the existing late seral areas on the Forest, some of the current stands have few large trees in the overstory. On the other hand, the OFSZ has the advantage of being laid out as a continuous unfragmented corridor as opposed to being broken up into smaller units. Management in areas outside of the old growth groves may include some active stand manipulation to accelerate the creation of these stand conditions, and in the case of the OFSZ, active management to maintain and recruit these conditions while at the same time producing some timber.

The late seral development area is concentrated in two areas, including the Mendocino Woodlands and Upper Russian Gulch areas, and in three areas adjacent to designated old-growth groves. Within these areas, the objective of management will be to develop older forest through a variety of means, from relatively passive to active management. The more active forms of management will be conducted to accelerate the development of late seral structure. Late seral structure targets will include a significant component of large, old trees (greater than 150 years), as well as large snags, large down logs, deformed trees, multiple canopy layers, and a high degree of within-stand variability. A similar management strategy will be applied in the WLPZ, although management will also concentrate upon the unique values that these areas provide to watershed processes, the stream, and the near-stream environment. This management strategy recognizes that the stream zones provide a valuable forested link within watersheds and across the Forest.

The older forest structure zone provides a valuable habitat corridor, linking many of the old growth groves across the Forest from east to west, and north to south. This area will be passively and actively managed to create functional habitat consisting of large trees, snags, down

logs, and a high degree of structural diversity. In some areas, often as part of research projects, active management will be conducted for both production purposes and to accelerate and create this habitat. Once large tree targets and other structural targets are met, timber harvest will be designed to ensure the retention, replacement, and recruitment of stand elements. Large and old growth trees of structural value will be retained and some individual large trees will be recruited so that all stands within the OFSZ will eventually have the key elements of older forests – large trees, old trees, large snags, down logs, and a diversity of tree sizes and canopy heights.

## **Forest Management**

JDSF is first and foremost a research and demonstration forest. This management plan identifies planned management based exclusively on biological, scientific, and social criteria. It is based on the premise that JDSF Forest managers have the discretion to allocate forest management treatments, within the framework established by this management plan, based purely on the best available science. The forest will be managed to develop the desired future conditions set forth in the previous section. JDSF will pursue certification of its forest management under the third-party processes, most likely via the Forest Stewardship Council and the Sustainable Forestry Initiative. A preliminary certification scoping review under these two systems was completed in fall 2005.

The primary focus of this Management Plan is to lay out best management practices for sustainable forestry on JDSF. Several criteria were central in developing these best management practices on JDSF. Silvicultural practices which are proactive in the development of mature and late-seral forest habitats were favored. In some areas such as old growth groves, areas immediately adjacent to larger streams, and parts of occupied habitats of threatened or rare species, the management will typically be “no management” except to protect the site from serious external threats or to improve specific habitat values.

The concept of sustainability requires a scientifically based long-term view with respect to the planned sequencing of forest treatments. A reasoned sequence of proposed treatments, based on sound silvicultural and ecological principles, is essential in meeting the defined land management objectives. The land management objectives and sequencing of treatments must be spatially allocated over the forest landscape in order to develop desired future conditions at the landscape level. A majority of the silvicultural treatments may not be directly associated with a specific research project, but rather will be aimed at creating the diversity of forest structure conditions replicated across the landscape, that is necessary for conducting future research projects.

The road map to desired future conditions on JDSF is articulated in this management plan through a set of forest structure goals (as specified in Table 3.2), a silvicultural allocation plan, and a short-term harvest schedule. The current structure and composition of the State Forest is reflective of past management and historic plans. Future management actions and natural growth processes will move the forest towards a more varied set of stand structures and habitat conditions, which are reflective of how management objectives on JDSF have evolved over the years.

The silvicultural allocation plan and short-term harvest schedule described here provide implementation guidelines for allocating harvest levels and silvicultural methods to different areas on the Forest. A key objective is to keep as many options available for future research and demonstration as possible within forest structure goals that primarily follow planning watershed boundaries. No single forest structure is favored over another. A key consideration is not to foreclose on future options, thus maintaining flexibility for future management and research installations.

Concepts applied to the silvicultural allocation plan include the following:

1. To demonstrate the variety and variable outcomes of management methods and silvicultural systems in use today or likely to be developed in the future for private timberlands within California, for both small non-industrial and large industrial timberland owners.
2. To provide significant areas dedicated to even-aged and uneven-aged management systems for purposes of comparing and contrasting wildlife habitat development, watershed effects, forest growth, sustainable production, product development, and economic efficiency.
3. To promote where possible the older forest development already in progress. Most of the planning watersheds subjected to single tree selection systems with second-growth stands in the past have been allocated to uneven-aged management in the future.
4. To distribute management systems across the spectrum of available soil productivity as well as to capture other variables in the abiotic diversity of the State Forest.
5. To test a range of approaches from fire protection only to different thinning regimes to maintain and actively develop structural elements common in older forests.
6. To promote neighbor-compatible silvicultural systems in areas near State Parks and Reserves, rural residential neighborhoods, and areas of concentrated recreational activity.
7. To create a diverse mosaic of forest age-class structures at the landscape level that will contribute to habitat stability; connectivity of old growth, late seral development areas, and older forest structure; and maintenance of biological diversity and functional forest ecosystems.
8. To facilitate future research by providing replicated and diverse forest conditions across a broad spectrum of environmental conditions.

Planning watershed boundaries were utilized to delineate basic structural target conditions or mix of conditions within the forest. The use of watershed boundaries provides for a separation between management units that enables monitoring of environmental effects from timber operations. The creation of defined management units with structure goals provides for long-term continuity of land management practices where environmental effects can be measured and monitored.

This plan provides for the side-by-side comparison of different silvicultural systems that will be of value to researchers, foresters, and landowners. The assignments of silvicultural systems to management compartments are arranged to create opportunities for researchers to compare experimental results with control areas having similar environmental attributes, as well as providing an opportunity to assess silvicultural systems across a broad cross-section of growing conditions.

This plan does not alter any of the protection measures associated with recognized areas of special concern. State Forest staff will continue to conduct site-specific assessments to determine the appropriateness of silvicultural prescriptions for any given area. For any given timber harvest, the THP process provides the CEQA-compliant environmental assessment process.

The allocation of silvicultural systems addresses potential conflicts with State Forest recreational use and local public interest values. Practices similar to even-aged silviculture that would encompass two and one-half or more acres were minimized in management compartments adjacent to areas where management is constrained. Uneven-aged management, which tends to maintain a continuous forest canopy, has been incorporated within the management compartments with identified sensitive public interest values.

Forest structure is created through natural growth and stand development processes in combination with the use of silvicultural systems. Silviculture is the art and science of stand manipulation to achieve desired conditions. Silvicultural systems are commonly utilized by timberland owners to manage forest stands in either an even-aged or uneven-aged condition.

Even-aged management is intended to create and develop stands within which most of the trees are of similar age. Some common systems to be demonstrated in even-aged management include variable retention, two-aged stands and one-aged stands (commonly called clearcutting). Harvest under this form of management tends to remove most of the trees from a given area to promote the regeneration of a new stand. It is common to retain a number of mature trees to provide structure for habitat purposes.

Uneven-aged management is used to create and develop stands with trees of differing sizes and ages. Some common systems to be demonstrated in uneven-aged management include single tree selection, cluster selection, and group selection. Openings within uneven-aged systems vary from an individual tree (1/100<sup>th</sup> of an acre) to clusters of trees (less than 1/4 acre) to openings designed to allow full sunlight (1/4 acre to 2.5 acres). Over time, uneven-aged systems have trees from at least 3 age or size classes. Periodic timber harvest in these stands removes selected individual trees or small groups of trees in order to promote growth of the remaining trees and to create an opportunity for new trees to develop or regenerate.

Older redwood forest tends to have an uneven-aged structure in nature. Approximately one-third of the Forest will be dedicated to the creation of stands that can develop toward an older or late-seral forest condition (the first two structure classes presented in Table 3.2). The form and amount of structural manipulation applied in these stands will vary according to the objectives for the given area. Active management may include light to moderate stand thinning, often of a variable nature, and other forms of stand management intended to achieve the desired conditions (the presence of large trees, snags, and large down logs within a stand that is both vertically and horizontally diverse).

Table 3.3 summarizes the planned acreage allocated to different silvicultural methods under this management plan. Tables 3.2 and 3.3 in combination provide a complete summary of the forest structure goals for JDSF and the silvicultural management strategy for how to achieve these forest structure goals.

**Table 3.3.** Planned Distribution of Silvicultural Methods.

<b>Silvicultural Method</b>	<b>Acres</b>	<b>Percent of Forest Acres</b>
No Harvest (old growth groves, pygmy forest, cypress groups, Conservation Camps)	1,350	3
Late Seral Development prescriptions	15,801	33
Uneven-aged; Single Tree or Cluster Selection	8,933	18
Uneven-aged; Group Selection or Single Tree/Cluster Selection	7,325	15
Uneven-aged or Even-aged; Single Tree/Cluster Selection, Group Selection, Variable Retention, Two-aged or One-aged (no more than cumulative 100 acres to be clearcut per decade)	12,788	26
Unclassified [research areas (variable silvicultural treatments) and power line right-of-way]	2,455	5
<b>Total</b>	<b>48,652</b>	<b>100</b>

#### Uneven-aged Management

A majority of the area devoted to timber production will be managed under an uneven-aged management system (35,502 acres or 73% of the Forest area). This is the dominant system

utilized by non-industrial forest landowners and others intent upon maintaining visual quality. Uneven-aged stands are generally defined as having trees of three or more distinct age classes. In practice, size class differentiation often complements or substitutes for age class differentiation. The Forest will be managed to utilize two predominant uneven-aged silvicultural systems, single tree/cluster selection and group selection. The objective of this variability is to demonstrate a range of silvicultural options under uneven-aged management, and to provide multiple future research opportunities.

### **Single Tree/Cluster Selection**

Single tree/cluster selection will be utilized to create small openings ranging in size between single trees and one-quarter acre. Single tree and cluster selection leads to stands with continuous forest cover, small gaps between trees, and a diversity of tree sizes and ages. The intent will be to enter each timber stand every 10 to 25 years to create a new age class. The residual growing stock level and the diameter distribution of trees in a stand will be adjusted on a site-specific basis.

Stand variability will be maintained in order to demonstrate a range of silvicultural options under uneven-aged management and to provide variable conditions available for future research.

The areas designated for this silvicultural method were intended to minimize potential conflict with recreation uses and with local public interest values. These management areas also share boundaries with private lands along the western edge of the State Forest and with developed recreation sites. They also form a viewshed from Highway 20. The basic management areas, or planned structure target conditions are depicted in Figure 5.

Many selection harvest units have not yet had the kinds of repeated harvest entries that lead to multiple age classes and canopy layers, and only a very few have had more than two such entries. Many stands to be managed under the selection system are even-aged, single-canopy second growth stands that have not been re-entered since their establishment, or have had only one partial cut that may or may not have resulted in successful creation of a new age class. Nowhere on JDSF is there a stand that displays the full range of trees of all sizes and ages that is the ultimate structure of the regulated<sup>1</sup> selection stand. Within the region, the practice of selective harvest of second-growth stands began only 40 to 50 years ago. A complete transition to an uneven-aged structure is largely theoretical, thus providing research and demonstration opportunities, and may take up to 80 years or more.

Each potential single tree/cluster selection harvest unit will be evaluated to determine the most appropriate treatment to move its condition towards a stand with a balance of age classes. Evaluation characteristics may include:

- Structural needs associated with creation of a dynamic mix of conditions across the Forest for future research and demonstration.
- Condition of regeneration or opportunities to promote regeneration.
- Stand density. An open stand tends to receive light at the level of the regeneration, so a light harvest of the overstory may be appropriate. A closed stand may indicate the need to create canopy gaps.
- Competing vegetation. Stands with large components of brush or hardwood may benefit from a more aggressive regeneration effort.

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<sup>1</sup> In the context of managed uneven-aged stands, “regulated” stand conditions are reached once the stand approaches a relatively stable and sustainable state where harvest is roughly balanced with growth over the cutting cycle.

### Group Selection

Stands managed under the group selection system will eventually consist of small forest patches at multiple stages of development, from recently regenerated to mature. The cutting cycle for an area designated for group selection will be 10 to 25 years. The goal is to establish and maintain three to five separate age classes.

The sizes of group openings will typically range from ¼ acre to 2½ acres. Group openings 2½ acres and larger are considered to represent even-aged management. Within stands, group sizes may remain fairly uniform to maintain the ability for comparison between stand management options. The intent under this plan is to demonstrate and assess a range of harvest opening sizes upon factors such as tree growth, regeneration of new trees, wildlife habitats, botanical diversity, operability, and financial considerations.

Criteria for selecting the sizes and configuration of group openings in a harvest unit may include:

- Forest-wide structure goals over time.
- Height of trees surrounding the opening. Smaller openings can be accommodated when surrounding trees are relatively short.
- Logging systems anticipated. The logistics of specific systems can be accommodated by the size, orientation, and arrangement of group openings.
- Shape. Long openings may require additional size to maintain sufficient levels of light for regeneration success.
- Orientation. Openings with the long axis aligned east-west will remain shaded along the south edge, while a north-south alignment may allow more sunlight to reach the opening. This effect may be accentuated on north-facing slopes.
- Site preparation and artificial regeneration. If these cultural practices are prescribed, their implementation can be more efficiently facilitated by larger opening sizes.
- Adjacency of neighbors, recreation areas, and other potential use conflicts.
- Species composition and stocking levels.
- Specific demonstration and/or research objective.

### Even-aged Management

Even-aged management is generally used to create and maintain stands with trees of the same or similar age. A maximum of 2,700 acres per decade (5.5% of the Forest) will be available for even-aged management. This form of management works best when the desired species of trees grow well with a lot of sunlight. It is increasingly common to retain a significant number of larger trees growing above or among the more numerous younger trees. These larger trees are generally retained to increase habitat values, to shelter the younger trees, to provide a seed source, or to accumulate volume for later harvest.

Some forms of even-aged management that are proposed for future demonstration include variable retention, two-aged stands, and one-aged stands including clearcutting. Variable retention is a form of management in which mature trees are retained in a variable configuration, and a new even-aged stand is grown beneath or between the retained trees. Retained trees may occur as scattered individuals, in groups, or in combination. The purposes for retention of the mature trees are numerous, including habitat value, watershed, and aesthetic considerations. Two-aged stand conditions have not been widely applied within the region, but offer an important research and demonstration opportunity to meld the continuous canopy concept of uneven-aged management with the concept of creating significant space and sunlight for promotion of a second age class developing beneath and between the overstory.

One-aged stands as the name implies designates stands where most of the trees are of the same age cohort. Clearcutting, which regenerates one-aged stands, will be restricted to a cumulative maximum of 100 acres (or 0.2 % of Forest area) per decade and only for purposes of research, demonstration, or addressing problematic conditions for regeneration. Up to an additional 400 acres may be clearcut per decade, but only for research purposes that cannot reasonably be met through any other method.

An important consideration for the landowner when applying forms of even-aged management is the concept of rotation age. Rotation age is the age at which a stand of trees is harvested and a new even-aged stand of trees is regenerated on the site. Science has demonstrated that stands can produce maximum physical yields when the average annual growth of the stand is at or near its peak (Lindquist and Palley, 1963; Schumacher, 1930). Land managers also need to consider the economic costs and risks associated with retaining a stand to an advanced age. This continues to be a fertile area for research and demonstration. A broad range of rotation ages will be demonstrated. Most even-aged stands are capable of achieving culmination of mean annual increment at ages between 60 and 150 years, with the longest rotations applied to sites with the lowest growth potential. Economically optimal rotation ages are generally considered to be shorter, in the range of 40-70 years.

There is considerable potential to vary the schedule and placement of even-aged units in order to maintain or create different habitat patch sizes and habitat connectivity. The structural attributes of an even-aged unit, as well as the growth and yield characteristics, can be affected by commercial thinning that may be conducted at intermediate points during the rotation. Some considerations in deciding whether or not to thin a stand include:

- Forest structure targets for research and demonstration purposes.
- Density and growth rate. A heavily stocked stand whose growth is being limited by tree-to-tree competition can benefit from thinning.
- Species mix. Different species reach tree or stand volume maturity at different ages. In mixed stands, cutting species that mature more quickly can increase overall stand health and growth.
- Time until regeneration. In a stand nearing rotation age, there may be too little time for the benefits of a thinning to be realized.
- Age class balance. It may be undesirable from a compartment-wide or forest-wide standpoint to create additional stands in the youngest age class. In this case, the productivity of a stand nearing rotation age can be extended by a thinning.

Some of the criteria that may be applicable in evaluation of stands for regeneration harvesting include:

- Forest structure targets for research and demonstration purposes.
- Stand growth. Stands with a projected mean annual growth rate that is much less than that expected may be candidates for regeneration. Conversely, stands exhibiting rapidly increasing growth may indicate harvest deferral.
- Cumulative effects. The amount of regeneration harvesting in an assessment area may need to be constrained in order to reduce the potential for adverse cumulative watershed, habitat, aesthetic, or other environmental impacts.
- Habitat diversity, habitat availability, patch size, and connectivity.

#### Short Rotations

Short rotation is defined here as even-aged regeneration harvest in stands where the average age is 60 years or less at the time of harvest. Short rotation, even-aged management is utilized



extensively on large forestland holdings throughout North America. It is a common management tool in the redwood region of California. JDSF serves as a research and demonstration source for a wide range of clients, including medium to large forestland owners. Short rotation forestry will continue to be an element of JDSF's management.

#### Long Rotations

Extending the time before harvesting a stand is a management option that can be implemented and studied. This approach may have applicability where cumulative effects are a concern, structural elements are desired that require larger trees, or where there is a desire to create more complexity on the landscape. Research in even-aged stands of Douglas-fir has shown that high levels of timber yields may be sustained by thinning over many decades (Curtis 1997). A relatively new consideration is the economic and social benefit of carbon sequestration to mitigate the greenhouse effect. In California, carbon retained beyond a regulatory age minimum may be registered and sold as an offset.

#### Areas Not Covered by this Silvicultural Allocation Plan

There are portions of the State Forest not covered by this silvicultural spatial allocation plan that may have some limited timber harvesting. The three largest areas with no assigned silvicultural system are North Fork Caspar watershed, the South Fork Caspar watershed, and the Mendocino Woodlands/Upper Russian Gulch/Lower Big River area.

The two Caspar management compartments make up the CDF-US Forest Service Caspar Creek Watershed study that has been in existence since 1962. Timber harvesting in these compartments will be planned and conducted to serve the needs of the research project. Timber harvesting is expected in one or both of these management compartments during the next ten years.

Most of the Mendocino Woodlands/Upper Russian Gulch/Lower Big River area will be managed as a late seral habitat development area. A study to demonstrate and assess the accelerated development of late seral habitat will be considered for this area. Possible management options include selective timber harvesting and/or prescribed fire to accelerate the natural stand selection process and to accelerate creation of large old trees and other functional habitat elements (i.e., snags, logs, cavities, dead tops). The State Forest will consult with wildlife management agencies, the California Department of Parks and Recreation, the California Department of Fish and Game, and other interested parties before proceeding with this project.

The Parlin Fork Management Area will continue to be managed using a group selection strategy as described in the 1992 Parlin Fork plan. State Forest staff will provide technical assistance and advice to the CDF Assistant Chief at Parlin Fork in environmental assessment and protection, harvest planning, reforestation, stocking control, burning, and other management activities.

Other smaller areas not affected by the silvicultural allocation plan include the Railroad Gulch Study Area, Whiskey Springs Study Area, Stone Study Area, and the Caspar Cutting Trials (See Chapter 4 for project details). These smaller areas have established on-going demonstration or research projects that will set them aside from the overall silvicultural plan.

Short Term Harvest Schedule

This section describes JDSF's short term harvest schedule, a companion document to the silvicultural allocation plan. This schedule lists the approximate locations of proposed harvest units and the general silvicultural treatments to be applied. This information is shown in Table 3.4 below and displayed in Figure 6.

The following issues were considered in the allocation of actual harvest units on the Forest:

- A cross-check against the management objectives and operational constraints as articulated in this Management Plan.
- Forest structure targets for research and demonstration purposes.
- Stand manipulation priorities. When certain stands can be either harvested or deferred, one tool to help decide is an evaluation of current stand condition along with a projection of stand growth following a proposed treatment. For example, a stand which is poorly stocked or which is growing slowly might be a better candidate for harvest than one that is vigorous and well stocked.
- Spatial distribution within the Forest. It may be both practical and preferable to avoid having simultaneous, side-by-side harvest operations because of the complications that can arise, including shared road use and maintenance, rule compliance responsibilities to different operators, and interference between cable line locations, or between cable lines and helicopter flight paths.
- Cumulative effects. Without considering the sequencing of operations within a watershed or other assessment area, the potential for adverse cumulative effects could be increased. Dispersing harvests across the landscape, for example, is one way to potentially avoid or mitigate some cumulative watershed effects.
- Maintaining a balance of workload from one year to the next. With a fixed workforce, it is prudent to have a mix of high-effort and low-effort harvest planning workload each year. Thus, two harvest plans that cover large areas and require complex assessments of road layout, harvesting systems, and environmental impacts might best be prepared in different years rather than both being completed in the same year.

<b>TABLE 3.4. Short-Term Harvest Schedule.</b>			
<b>Sale Area Name</b>	<b>Planned Silviculture</b>	<b>Harvest Acres* (approx.)</b>	<b>Planning Watershed (see Figure 1)</b>
Camp 3**	selection, cluster selection	366	Brandon Gulch
Brandon**	selection, cluster selection	540	Brandon Gulch
Parlin	commercial thin / alternative prescription with scattered, grouped, and combination scattered and grouped structure retention	251	Parlin Creek
Mitchell	selection/cluster selection /group selection	635	Mitchell Creek
Tunnel	alternative prescription similar to seed tree, with structure retention /selection	54	Hare Creek
Helms	selection/group selection/combined selection and group selection/with control stands	250	Mouth of Big River/Berry Gulch
Northfork Spur	selection/cluster selection	600	Brandon Gulch
14 Gulch North	group selection with small, medium, and large groups	400	Berry Gulch
West Chamberlain	commercial thin/old forest structure development	650	Chamberlain Creek
Hare Creek GHIJK	selection/cluster selection, clusters with matrix thinning, clusters with no matrix thinning/variable WLPZ demonstration	250	Hare Creek
Upper Hare Creek	selection/cluster selection/variable WLPZ treatment demonstration	100	Hare Creek
Volcano #2	group selection with small, medium, and large groups; with and without matrix thinning/selection with road and trail corridor	500	Brandon Gulch
Park Gulch	group selection/silvicultural demonstration area with selection; cluster selection; group selection with small, medium, and large groups, with and without matrix thinning	300	Chamberlain Creek
Riley Ridge	old forest structure development using light and moderate thinning with variable density hardwood retention	600	Brandon Gulch
Frolic #2	two-aged stand/variable retention/alternative prescription using combination of scattered and clumped retention/with control stands/variable WLPZ treatment demonstration	200	Parlin Creek
Berry Flat	commercial thinning/selection/cluster selection/with road and trail buffer	50	Berry Gulch
Road 80	two-aged stand/alternative prescription similar to seed tree, with clustered structure retention/clearcut(max. 20 acres total clearcut area)	200	Parlin Creek
Waldo	two-aged stand/variable retention/ alternative prescription similar to seed tree with clustered structure retention/clearcut (max. 20 acres total clearcut area)/variable WLPZ treatment demonstration	150	Parlin Creek

<b>TABLE 3.4. Short-Term Harvest Schedule.</b>			
<b>Sale Area Name</b>	<b>Planned Silviculture</b>	<b>Harvest Acres* (approx.)</b>	<b>Planning Watershed (see Figure 1)</b>
Water Gulch #1	commercial thinning with light and moderate thinning	300	Chamberlain Creek
Pleiades #4	selection/cluster selection (4th selective cut)	50	Kass Creek
West Berry Gulch	light and moderate commercial thin/silvicultural demonstration area with selection; cluster selection; group selection with small, medium, and large groups, with and without matrix thinning/two-aged stand	400	Berry Gulch
Dunlap South	group selection with small, medium, and large groups with and without matrix thinning	350	Chamberlain Creek/Lower North Fork Big River/Two Log Creek
Orchard	selection /cluster selection/group selection with small groups, with and without matrix thinning	500	Caspar Creek
Walton Gulch #2	two-aged stand/variable retention/alternative prescription similar to seed tree with scattered and clumped structure retention/variable WLPZ treatment demonstration	100	Hare Creek
Thompson Gulch	late seral development using light and moderate variable density thinning and selection	250	Berry Gulch
Water Gulch #2	light and moderate commercial thin/silvicultural demonstration area with selection; cluster selection; group selection with small, medium, and large groups, with and without matrix thinning/two-aged stand	450	Chamberlain Creek
Scissors #2	selection with road and trail corridor/cluster selection/variable retention/alternative prescription similar to seed tree with clumped structure retention	100	Parlin Creek
Dunlap North	light and moderate commercial thin/selection with road and trail corridor/cluster selection	300	Chamberlain Creek
S Whiskey Springs	light and moderate commercial thin/selection/cluster selection/selection with road and trail corridor	300	Berry Gulch
*For group selection units, the number in this column represents the total area of the unit. Typically, about 20 percent of the area is in group openings; the remaining area is sometimes thinned during the group selection harvest entry.			
**The Camp 3 and Brandon THPs are currently enjoined from operation and subject to a stipulated agreement under First District Court of Appeal Case No. 102911 and Mendocino County Superior Court Action No. SCUK CVPT 0289022.			

The short term harvest schedule will be flexible and subject to modification through adaptive management. It will be reviewed and updated annually to maintain a five-year plan of future harvest activity. This process is important for several reasons:

- Accommodating research and demonstration needs.
- Planning wildlife assessments for Timber Harvesting Plans, where some species evaluations require multiple years of surveying effort.
- Anticipating road system extensions, or reopening of temporary roads.
- Conducting cumulative effects assessments.
- Monitoring consistency with both the long-term harvest schedule and the provisions of this Management Plan.
- Making revenue projections so that budget planners will know what to expect.
- Unanticipated circumstances.

#### Special Concern Areas

To implement the Plan, areas of special concern that constrain management were identified (Appendix II) and provisions for their management were established. Special concern areas include unique habitats, habitat for species of concern, riparian areas, recreational areas, areas near residences and parks, research areas, water supplies, and sensitive slopes (Figure 5).

With the special concern areas identified, a plan was formulated to maintain or restore ecological function in all areas, to create diverse forest types and specific structural attributes, to produce high levels of sustainable timber growth, and create opportunity for a viable research and demonstration program (Table 3.4).

Areas of special concern can be derived from management policy-driven and objective-driven constraints, or can be imposed by external influences such as physical or biological limitations or legal requirements. Many areas may be influenced by a combination of factors, management and objective driven, as well as those imposed by external influences. Major areas affected by management policy-driven and objective-driven constraints are:

- Reserved old growth groves.
- Late seral development areas.
- Older forest structure zone.
- Campground buffers.
- Conservation camps.
- Road and trail corridors.
- Parlin Fork management area.
- Research areas.

Some constraints are imposed by external influences such as physical or biological limitations, legal requirements, or Forest Practice regulations. These areas may also be affected by management policy-driven and objective-driven constraints, such as structure targets established for riparian zones and buffers adjacent to non-timberland neighbors. The major areas affected by these constraints are:

- Cypress groups
- Pygmy forest
- Jughandle Reserve
- Eucalyptus infestation area
- Inner gorges
- Areas with a high relative landslide potential

- Northern spotted owl nest areas
- Osprey nest areas
- Watercourse and Lake Protection Zones (WLPZs)
- Woodlands special treatment area
- Domestic water supplies
- Buffers adjacent to non-timberland neighbors
- Power line right-of-way
- State Park Special Treatment Areas

Parts of the Forest not affected by these constraints are generally available for an allocation of management options that can be selected to best meet the array of management goals.

To ensure that management activities do not conflict with these constraints, a comprehensive reference list has been compiled and the affected areas have been mapped.

During the course of planning regular timber harvesting operations, adjacent special concern areas where timber harvesting is allowed will be evaluated for their suitability for concurrent management treatments. For some special concern areas, notably research areas, a dedicated timber harvest or other project may be designed specifically to fulfill the objective of that area.

#### Timber Sales

The majority of timber harvesting operations will continue to be conducted through the same type of timber sale program that has been in place for the past 40 years, as described in Chapter 2. Typically, one Timber Harvesting Plan will be prepared for each timber sale. Sizes of individual sales will typically vary from one to several million board feet, though smaller sales may occur, as further discussed below.

Three to five sales each year will usually be realized. Stumpage will continue to be sold through a bidding process. The successful bidder will normally subcontract the logging. Contract terms will usually be for one operating season for sales at the lower end of the size range, and two seasons for larger sales. Timber harvest operations are scheduled every year in order to make timely progress towards achieving the desired future forest structure, habitat diversity, and demonstration objectives. A program of annual harvests is also required by the logistical considerations of workload stability and revenue projection.

Recent, current and foreseeable future market conditions rank the Forest's merchantable conifer species in the following order of value. Current stumpage values are from the State Board of Equalization ([http://www.boe.ca.gov/proptaxes/pdf/2006\\_2H.pdf](http://www.boe.ca.gov/proptaxes/pdf/2006_2H.pdf)).

- |                          |  |
|--------------------------|--|
| 1. Redwood               | \$680 to \$840 per thousand board feet (Mbf) |
| 2. Douglas-fir           | \$260 to \$300 per Mbf                       |
| 3. Hemlock and grand fir | \$50 per Mbf                                 |

Although there is a small and intermittent tanoak lumber industry in Mendocino County, to date the demand for raw products has only been sufficient to make the species little more than a byproduct of conifer management. As of this date, the market for tanoak and other hardwoods as fuel has rarely been profitable enough to warrant investment in their management. Although red alder is considered a merchantable species in parts of the Pacific Northwest and used for furniture, it is locally limited in extent and confined primarily to riparian zones.

As part of the balance between maximum production of high quality forest products and the maintenance and enhancement of other forest resources, there is value in retaining naturally

occurring species as part of the forest ecosystem. Although there is some understanding of the roles played by various elements in ecosystem function, there is much that is still not understood.

Stands managed for sustained timber yields will be harvested and regenerated to favor the two higher-value merchantable species, redwood and Douglas-fir. Hemlock and grand fir, which typically occupy no more than five to ten percent of productive stands, will be managed at their current levels. Bishop pine, an aggressive pioneer species following stand disturbance, will be managed as only a minor species where it occurs in commercial stands. Hardwoods will be managed to achieve conifer/hardwood ratios similar to pre-European stand conditions.

Where artificial regeneration is used following a timber harvest, both redwood and Douglas-fir seedlings may be planted. The relative numbers of each species will be determined after an assessment of the site to evaluate whether it is more suited for one species or the other.

Hardwoods are a minor component of stands on the west end of the Forest, averaging approximately 11 percent of the basal area. These species are of recognized habitat value. Representative trees of large sizes will be retained or recruited, in addition to trees with other structural values, such as basal hollows and cavities. In the eastern area of the Forest, hardwoods make up approximately 30 percent of the basal area on average. In this area, hardwood management prescriptions will be implemented as part of a strategy to gradually shift the species mix toward the former conifer dominated stands of pre-European conditions. Commercial thinning and selection will be utilized to manage hardwoods in most stands. Several methods are available to reduce the level of hardwood within forest stands. These include mechanical cutting, promotion of competing conifers, and, under some circumstances, hand application of herbicides. If mechanical or other methods are not feasible due to potential environmental impact, stand damage, or excessive cost, selective prescriptive herbicide techniques may be considered.

Some landowners structure their timber harvest operations to sell delivered logs rather than standing timber. By contracting directly with the logging operator rather than through a timber purchaser, more control can be maintained over the quality and specifics of the harvesting operations. This can be especially important where there is a research aspect to the logging process itself and the details of the operation are critical to the study. There may also be some economic advantages that can be gained by marketing different products (log size and species mixes, for example) to different primary manufacturers. The Forest staff will consider selling at least some timber as delivered logs rather than standing stumpage sales, assuming that effective budgeting and logistical options can be implemented.

The Forest will pursue opportunities to market small blocks of timber to individuals, small businesses, and other non-traditional timber purchasers. To the extent that state regulations will allow, the timber sale staff will investigate the possibility of either targeting small sales to registered small businesses, or giving registered small businesses a preferential allowance in the bid award process. There are considerable possibilities for demonstration projects in this subject area and demonstrated local interest.

### Logging Systems

The three logging systems used and anticipated on the State Forest are tractor, cable, and helicopter. Selection of the logging system for a harvest unit is based primarily on terrain and site sensitivity, with other factors such as noise and accessibility playing a role in some cases.

#### **Tractor Logging**

Tractor logging, referred to as “ground based” in the Forest Practice Rules, includes skidding with track-laying bulldozers, rubber-tired skidders, and other machines which travel along the ground

and drag the logs behind them. These machines can be equipped with grapples or a winch and line. Winch lines generally do not exceed 150 feet in length. Tractor logging is used on gentler slopes where it can be accomplished with minimal ground disturbance and without jeopardizing water quality by mobilizing sediment near streams. Skidding equipment can often work on slopes up to 35 percent or more without excavating skid trails. As slopes steepen, skid trail construction and soil displacement become more likely. The practical limit of reach with a winch line is about 200 feet. On gentle terrain, and when skidding downhill, tractor skidding is usually more efficient and cost effective than cable and helicopter logging. Where protection of residual trees and regeneration is important, tractor logging often has an advantage because it is easier to control the logs as they are being moved. Adverse skidding (skidding uphill) is inefficient on slopes over about 30 percent and impractical over 50 percent. The Forest Practice Rules prohibit tractor logging on slopes over 65 percent, or over 50 percent where certain sensitive conditions exist.

### **Cable Logging**

Cable logging involves use of a suspended cable controlled by a stationary yarding machine to provide lift to the logs being moved from slopes to the road. Nearly all cable logging done on the State Forest is referred to as short span skyline, meaning that the cable can reach up to about two thousand feet from the yarder and can lift at least one end of the logs being skidded. Cable logging has the advantage of not requiring heavy equipment to travel throughout the harvest unit, thus reducing the amount of ground disturbance. Cable unit configuration is determined by where the yarder can be positioned. Although it is possible for some yarders to travel cross-country on gentle to moderate slopes, yarders generally operate from roads. Cable yarding commonly conducted with the yarder positioned in a roadway above the harvest unit (uphill yarding). In some cases it is possible to log not only the slope immediately below the yarder, but also the opposite slope, lifting the logs clear of any watercourse and riparian zone in the valley. This can have enormous benefits in reducing the need for truck roads and stream crossings. One disadvantage of cable logging is that clear corridors must be created where yarded logs follow the path of the skyline cable. There is no practical limit to the steepness of slope that can be cable yarded. Communication between the yarder operator and workers below is by means of a horn which can bother residents and recreationists in the vicinity of the logging operation. In terms of efficiency and economics, cable logging typically costs about 25 percent to 50 percent more than tractor logging, although there are situations of steep but feasible slopes where cable logging may be lower cost than tractor logging.

### **Helicopter Logging**

Helicopters can be used to lift logs clear of the ground and move them to a roadside log landing area. This system provides a high level of protection to sensitive areas, but it is significantly more expensive than cable and tractor systems. Because of the downdraft from the rotors, helicopters can cause damage to residual trees by breaking tops and branches. Both downdraft and noise are potential impacts on nests and other wildlife elements, and noise can be a serious disturbance to residents and recreationists even a significant distance away from the operation. For safe operation of loading equipment, helicopter operations usually require larger landings than those required for cable or tractor logging.

In general, helicopter logging will be used in inaccessible and particularly sensitive areas. These would include odd corners within the property lines and long, steep or convex slopes where it is not feasible to place an access road and yarder landing above the harvest unit. Considerations of noise and disturbance impacts on nest sites and neighbors will affect the decision to prescribe helicopter use. Cable systems will be employed on steep slopes (generally above 35 percent) and in other areas where sensitive resources require protection from ground disturbance. Tractors will be used on the gentler slopes along ridgelines and on terraces.



Most of the anticipated road construction on the Forest will be to access new landings to serve one of the three logging systems described above. Thus, the design of logging and road systems go hand-in-hand.

The December 2005 DEIR identifies three mitigations for potential adverse noise impacts related to logging. For two of the three potential impacts, the mitigations were identified as needed to avoid significant adverse impacts. These three mitigation measures will be implemented as part of the Management Plan and are included in Appendix X.

## **Specific Management Programs, Practices, and Standards**

This section presents, by subject area, the specific management programs, practices, and standards that are to be implemented on JDSF. This section provides some of the most specific direction for the management of JDSF during the life of this management plan. Additional specific management measures and mitigations that were identified during the preparation of the December 2005 Draft Environmental Impact Report are included in Appendix X.

### Road Management

The objective of the Road Management Plan (see Appendix V) is to ensure that the design, construction, use, maintenance, and surfacing of JDSF roads will minimize sediment delivery to aquatic habitats. Improvement of JDSF roads to reduce sediment yield is needed due to the legacy of a road network partially relying on out-dated drainage systems and old segments located along watercourse channels. Numerous studies have shown that forest roads are a major source of management-related stream sediment. The Road Management Plan for JDSF, included as Appendix V, is a program to inventory the existing roads and crossings, improve the road segments that will remain in the permanent transportation network, and abandon high risk roads where possible. Additionally, the road plan provides guidelines for new road construction. The goal of this program is to enhance stream channel conditions for anadromous fish, amphibians, and other sediment-sensitive aquatic organisms by reducing both fine and coarse sediment loading. The plan will also improve water quality by reducing suspended sediment concentrations and turbidity. The Road Management Plan includes the following primary components, which are summarized below.

### **Inventory and Priority Setting**

The inventory of roads and stream crossings will provide the basis for upgrading and mitigating the road system at JDSF. It will allow the Forest staff to: a) identify problems that can be corrected through routine maintenance activities; b) assign maintenance and mitigation priorities to planning watersheds, road segments, and crossings; c) identify the most effective designs for roads, landings, and culvert problem sites; and d) identify roads to be properly abandoned. To the extent feasible, during the first three years of Plan implementation, all existing roads will be inventoried. Following a reconnaissance level screening for problem sites, staff and other consulted experts will develop site specific mitigation measures for identified significant potential or existing problems.

The locations of critical habitat for coho salmon and steelhead will be used to prioritize the sequence of the road inventory work. Secondary factors will include existing rates of sediment delivery to sensitive watercourse channels, based on gradient and degree of confinement, and likely hazards such as high density of riparian roads or stream crossings. Following the

inventory, priorities will be set for the work to be completed, including repair of problem road, landing, and crossing location sites, and proactive abandonment of appropriate roads. Budget authority granted beginning in the 2006/07 fiscal year authorizes \$600,000/year for road inventory and improvement work on JDSF; however, these funds will only be available if adequate FRIF revenues are generated to fully fund the budget level authorized for the Demonstration State Forest Program. Forest staff will complete the priority listing of road work as quickly as feasible within the constraints of actual budgets and the road work that can be accomplished as a part of THPs.

Until the inventory is completed and Forest-wide priorities for road upgrades set, survey and evaluate all appurtenant roads as a part of each THP; complete the identified needed road upgrades as a part of the THP.

### **Design and Construction**

Road, landing, and crossing design will follow the current state of the practice, such as is currently described in the Handbook for Forest and Ranch Roads (Weaver and Hagans 1994), or as suggested by JDSF RPFs and CEGs where a timber harvesting plan (THP) has been submitted. Existing and new roads needed to accommodate cable yarding on slopes steeper than 40 percent will generally be located on or near ridge lines (although mid-slope roads will remain). The goal for the final transportation network is to establish roads in low risk locations that will accommodate appropriate yarding and silvicultural systems. A specific target road density, however, will not be used. Roads in unstable areas will be avoided whenever possible and are only to be built if a CEG finds it unlikely that mass wasting will deliver sediment to a watercourse.

### **Use Restrictions**

Wet weather operations on JDSF will be minimized. Specific measures include: a) no truck hauling when greater than 0.25 inch of precipitation has fallen during the preceding 24 hour period (applies to the entire year); b) no hauling/vehicle access when road rutting is occurring at a rate greater than that found during normal road watering, c) resumption of hauling only after rain has ceased for 24 hours and no turbid water produced from road surface runoff is observed in ditches along the roads where hauling may occur, and d) seasonal closure or surfacing for roads located in WLPZs if they are subject to moderate to heavy log truck traffic during the winter period.

### **Inspection and Maintenance**

Proper maintenance is a key to reducing the long-term contribution of road related sediment. Permanent and seasonal roads will be inspected at least once annually to ensure that drainage facilities and structures are functioning properly. Two types of inspections will be used: 1) formal inspections, and 2) rapid ad hoc inspections. During formal inspections, all crossings and roads will be carefully observed every two years, and problem sites will be recorded on road/crossing inventory forms. To cover the period between detailed inspections, a rapid ad hoc inspection will be made by JDSF Foresters and other staff during normal activities. "Storm patrol inspections" of known or anticipated problem facilities will be triggered by large winter storm events. Abandoned roads will be inspected at least twice following the completion of the decommissioning process, including at least one inspection following a stressing hydrologic event.

**Abandonment**

Information for identifying and prioritizing road segments requiring abandonment will come from the road inventory, which will be completed over the first three years of the Road Management Program. The actual number of miles that will be proactively abandoned will depend on the results of the inventory, but it is estimated to be between 50 and 100 miles. Some of the criteria that will be used to identify candidate roads to proactively abandon include: 1) unstable areas, 2) roads in close proximity to a watercourse (particularly Class I watercourses with anadromous fish habitat), 3) roads not needed for management purposes, and 4) roads with excessive amounts of perched fill on steep slopes or in close proximity to watercourses.

**Mitigations Related to Crossings and Watercourses**

Refer to the mitigations/management measures for the following topics that have been included elsewhere in Chapter 3 and Appendix X to minimize potential impacts to the resources at risk: Heritage Resources, Fish, Wildlife, and Plants, and Watersheds as well as the mitigations included in the Road Management Plan (Appendix V) and the DEIR. The following are an example of mitigations found in those sections that are specific to roads located in or near watercourses:

1. Roads to be part of the permanent road network are to primarily utilize upper slope locations without ditchlines connected to watercourses where possible.
2. Roads located within watercourse and lake protection zones (WLPZs) are to be abandoned where other existing feasible routes are available. Where there are no feasible alternatives, use will be minimized.
3. Winter storm inspections are to be used in sample and high-risk areas to insure that road drainage structures are functioning properly.
4. Work is to continue to restrict public motorized vehicular access to vulnerable sections of the road network during the winter period, as well as to educate the public regarding the importance of wet-weather road closures.
5. Road segments near watercourses that are to remain in the permanent transportation network with inadequate road surfacing will be evaluated for potential surfacing with competent rock to reduce surface erosion.
6. Placement of road spoils within the WLPZ will be avoided.

Heritage Resources

Agencies of the State of California have been directed to manage heritage resources under their jurisdiction in accordance with a variety of state policies, mandates, and regulations. CDF will continue to protect both the historic and prehistoric heritage resource sites located within JDSF. Where possible, protection will include site avoidance or mitigation intended to prevent resource damage. JDSF will, whenever feasible, avoid damaging effects on any historical resource of an archaeological nature. Preservation in place is the preferred manner of mitigating impacts to archaeological sites. Preservation in place maintains the relationship between artifacts and the

archaeological context. Preservation may also avoid conflict with religious or cultural values of groups associated with the site.

In the ongoing effort to preserve and protect the heritage resources on JDSF, CDF continues to investigate methods and procedures that will improve and enhance the effectiveness of its heritage resource management program.

### Management Goals

1. Maintain the existing comprehensive, confidential heritage resources database for JDSF lands for use by designated on-site managers, including systematic mapping of prior archaeological survey coverages, and locations of formally recorded and noted heritage resources; concurrent with this, establish a single systematic numbering system for sites assigned various designations (primary numbers, trinomials, IHR numbers, field numbers, etc.) and for bibliographic references; compile copies of all heritage resources reports pertaining to JDSF, and establish a numeric system for retrieving these references; establish a reference library of pertinent regulations and laws, and relevant ethnographic, historical and archaeological publications (cf Government Code Section 6254.10).
2. Assign responsibility for managing heritage resources to an on-site staff person who will maintain the above database and interface with professionals as needed, and serve as the point-of-contact for Native Americans who have heritage ties to the Forest and other interested parties such as local historical societies (cf. PRC Section 5097.9).
3. Formally record all historic period sites and features noted by Gary and Hines (1993) and Medin (1994) (cf. Foster and Thornton 2001:68; OHP 1989, 1995).
4. As needed during project review and in consultation with the SHPO, complete formal site significance evaluations per California Register of Historical Resources criteria for all recorded resources, relying on pertinent references, for contextual information about historic sites, buildings and structures and more recent regional studies of prehistoric resources (cf. PRC Sections 5020 through 5024; CEQA; OHP 1991).
5. Through the designated on-site heritage resources manager (Goal 2, above), consult directly with interested Tribes to identify traditional cultural properties, appropriately manage important traditional native plant collecting areas), establish protocols for Native American access for collecting, and provide opportunities for their participation in interpreting Native American history and prehistory at JDSF for public benefit (cf PRC Section 5097.9; CDF Native American collecting policy).
6. Identify and catalog existing archaeological collections and archival materials, to the extent practical consolidate collections in a secure place accessible for research and interpretation, establish a collecting policy for JDSF staff and contractors, and implement a curation plan that includes accessioning future collected artifacts and pertinent records (cf. Foster and Thornton 2001:69; *Guidelines for the Curation of Archaeological Collections*, per PRC Section 5020.5(b); California and Federal NAGPRA laws).
7. Monitor and periodically inspect heritage resources on JDSF to ensure that existing policies are providing effective protection (cf. Executive Order W-26-92; PRC Sections 5020 through 5024; CEQA).
8. Conduct heritage resources training for all permanent CDF field forestry staff working at JDSF, and obtain and maintain current certification in identification of archaeological sites for key staff to assist with heritage resources surveys, site recordation, monitoring of mitigation measures and

site conditions, handling inadvertent discoveries, and educating contractors and the public about heritage resource protection laws and JDSF's heritage resources.

9. As funding and opportunities allow (e.g., competitive grants, interagency agreements with California State University anthropology programs), CDF will prioritize completion of a general (non-THP-specific) heritage resource inventory (including formal recordation and significance evaluation) for road systems and for those areas of JDSF suitable for tractor logging and where the highest ranked, appropriately sized merchantable conifer timber (e.g., redwood and Douglas-fir) occurs.

10. In concert with the road inventory described in the *Road Management Plan* for JDSF (DFMP Appendix V), make it a priority to complete within three years, the heritage resources inventory for the existing road system (including rock borrow pits and related appurtenances) by employing standard procedures described in *Archaeological Review Procedures for CDF Projects* (Foster 2003). Consult with interested Tribes to determine if significant traditional cultural properties or other heritage resources such as plant collecting areas are present and may be affected. Planning for road improvements or abandonment needs to consider and implement measures to avoid or minimize potential impacts to significant heritage resources. Document heritage resources study findings using the CDF Archaeological Survey Report form or other report format consistent with OHP (1989) guidelines.

The following strategies are intended to achieve these goals.

### ***Survey Methods***

The recent identification of previously unknown sites suggests that the potential for discovering additional prehistoric sites within JDSF has not been completely exhausted. The dense forest environment of JDSF and the resulting ground cover present an impediment to the successful identification of archaeological sites. The heavy accumulation of duff, leaf litter, slash, and thick understory vegetation can limit ground surface visibility. These conditions limit the effectiveness of visual pedestrian surface survey as a method for the identification of heritage resources. These conditions also hamper the accurate determination of site boundaries for those resources that are located. In many cases, topographic and environmental features must be employed to designate the most probable site areas.

As resources allow CDF will seek to undertake archaeological surveys at JDSF that are outside the scope of project planning activities. It is unlikely that the current inventory represents all of the archaeological sites located on the forest. The utilization of intensive survey techniques will be considered during these surveys in an effort to locate additional sites. In areas with limited ground surface visibility and where the obtrusiveness of archaeological remains is low, pedestrian surface survey may not be adequate to identify sites. More intensive survey techniques may be needed, such as periodic surface raking, mechanical vegetation removal, soil chemical surveys, or various forms of remote sensing. In these types of environments, a program of subsurface testing is usually necessary to discover buried archaeological remains. Subsurface testing can be accomplished by test pits and core sampling (Feder 1997). An attempt will be made to secure funding for intensive archaeological surveys in addition to the project-based surveys that currently occur.

### ***Site Recording***

All newly identified archaeological sites located within JDSF will be appropriately documented soon after their discovery. Guidance for preparation of records is provided by the California Office of Historic Preservation (CDPR 1995). These records often include some combination of written description, site sketches, photographic records, and location maps as appropriate for the specific resource.

CDF will seek resources to record the known historic era sites located within JDSF. Many of the historic-era sites within JDSF have not yet been fully recorded, and some of the existing records do not meet current recording standards. Two recorded prehistoric sites, CA-MEN-1366 and CA-MEN-1694, have not been relocated since their initial documentation, although there have been attempts made to do so. Additional survey of the areas where these sites were reported to occur will be undertaken by CDF staff in an attempt to relocate them.

### ***Site Significance***

All sites discovered on JDSF will be evaluated for potential significance. The protection of heritage resources is predicated on the perceived significance of the resource. One of the principal criteria for determining the significance of a site lies in the ability of the resource to provide information that can be useful in understanding the past. In a specific regional context, a significance assessment should take into consideration the ability of the site to address specific research questions. Integrity and condition are additional factors used to evaluate the significance of a site.

Sites that have been heavily impacted have potential to produce materials that can contribute information to answer important scientific research questions. This evidence can include ceremonial paraphernalia, formed tool artifacts, and lithic debitage. Obsidian debitage in particular, is a valuable source of archaeological information offering the potential to reconstruct prehistoric exchange networks and cultural chronology through sourcing and hydration analysis. Formed tool artifacts can be used to interpret site function. Simply because sites have been damaged does not mean that they can no longer contain valuable information or are no longer significant.

### ***Collections***

Artifacts in the CDF collections are linked to specific sites, but often have no accurate provenience from within the site area. As these sites are depleted of surface artifacts, it becomes more and more difficult to establish accurate site boundaries. Artifact provenience then becomes an important tool for accurately determining the site area on the ground. Collections are now located at three separate institutions making comparative analysis difficult. This also represents a missed opportunity for public interpretation. CDF should establish a uniform collection policy in consultation with CDF archaeological staff. The minimum collection standards suggested by Betts shall be considered (1999). It is recommended that CDF archaeological staff consider a centralized collection and display of resources gathered from JDSF.

### ***Research and Demonstration***

The identification and protection of cultural resources are important components of forestry in California today. Registered Professional Foresters are required to attend archaeological training classes to acquire the ability to recognize cultural materials, and to develop resource protection measures. The Confidential Archaeological Addendum forms an integral component of THP preparation. In its role as a demonstration forest, JDSF can serve as a proving ground for the development and implementation of effective heritage resource management strategies and techniques. JDSF will continue to serve as an essential location for demonstrating viable heritage resource management strategies.

### ***Research Design***

The conduct of modern archaeological research is directed by research designs. A research design is a statement of the theoretical and methodological approaches that will be followed in an archaeological study (CDPR 1989).

CDF shall consider review and update of the research design for JDSF. As part of the original cultural resource overview prepared for JDSF (Levulett and Bingham 1978) a set of research questions was developed in order to guide future surveys and data recovery projects. Since the development of these research questions, extensive archaeological research has been carried out in the North Coast Range region. These questions should be reexamined in light of the most current research to determine their relevance. A research design that addresses the historic archaeological sites within JDSF has not been formulated. An updated research design should be developed for JDSF that includes both historic and prehistoric resources, and is consistent with current theoretical concepts and methodological practices. This research design can then be employed to structure future archaeological investigations within the forest.

CDF's archaeological staff shall seek opportunities to conduct additional archaeological and historical research on the forest. Archaeological excavations at sites within JDSF will be undertaken when opportunities present themselves such as through an association with a state university or when necessary as a part of project planning, or if research funds become available. Consideration should be given to a long-term research project that would more intensively investigate the archaeological sites on the forest. A program of more intensive site investigation could also be undertaken in an effort to more completely and accurately define site boundaries. The delineation of more accurate site boundaries could help to avoid future management conflicts. Formal evaluations could also be undertaken in order to make determinations of the significance of individual sites. The effects of ongoing site impacts could also be partially mitigated by carrying out additional archaeological research. The two excavation projects that have been carried out on JDSF can serve as models for this type of research. The investigation at Three Chop Village (Layton 1990) was not related to potential project impacts, but was driven by a desire to explore the prehistory of the region in a spirit of stewardship for this resource. The excavation at Misery Whip Camp (Hylkema 1995) was an example of management other than protection through avoidance or alteration of project design.

### ***Site Evaluation***

Detailed site evaluations will be considered as potential research and demonstration projects. Archaeological sites are evaluated to determine their significance. One of the principal criteria for determining significance lies in the ability of the resource to provide information that addresses specific research questions. Of the research questions developed by Levulett and Bingham (1978), to date only one has been formally addressed in an archaeological study. The question regarding the nature of Three Chop Village has been examined as a result of excavations carried out at that site (Layton 1990). This investigation produced substantial information that made a significant contribution to regional research goals. Since most of the previously outlined research questions have yet to be examined, all of the prehistoric archaeological sites on JDSF may be considered potentially significant based on the criterion that they contain information needed to answer these research questions. Some of the historic sites on the forest also hold the potential to provide information to answer scientific research questions. There is potential for the combination of several sites to provide answers to important research questions.

### ***Mitigation Measures for Heritage Resources from DEIR***

The December 2005 DEIR identified 18 mitigation measures to be applied to the proposed Management Plan to address potential significant adverse impacts to heritage resources. These mitigations are hereby incorporated into this Plan, refer to Appendix X.

### **Minor Forest Products**

The State Forest will continue to offer the opportunity to purchase minor forest products, subject to specific rules and constraints. Sales may be made to both the public and commercial private interests. Small sale (Class I) permits can be purchased for collection of products including salvage sawlogs, poles, split products, greenery (e.g. boughs, shrubs, and ferns), mushrooms, and firewood.

JDSF will strive to achieve a sustainable public use of the Forest and all its resources utilizing the following management procedures:

Continue to administer permits for collection of minor forest products.

- JDSF law enforcement staff will check for valid permits and compliance with permit conditions and other Forest use restrictions.

Continue to record, quantify, and report on permits annually. Use data to monitor resource collection trends, pressure, and forest health.

- On an annual basis, staff will review policies, prices and procedures for collection permits and revise as appropriate based on permit data collected.

Offer personal-use and commercial firewood collection following timber harvesting operations (if portions of the area can be made accessible to the public, subject to restrictions designed to protect the environment).

Firewood may be collected for use while camping, subject to a valid camping permit. Mushrooms may be collected for both personal and commercial use, subject to a valid permit.

Restrict collection of forest products where potential environmental effects are unacceptable, such as cutting of green redwood burls, manufacture of split products from desirable large woody debris, and salvage of wind-throw from riparian areas.

Identify areas on the forest where small, Class I (minor) timber sales could be developed for bid by Licensed Timber Operators.

- Small sales designed to achieve forest management goals, such as fire prevention, reforestation, hazard removal, and/or pest infestation
- Small sales designed to recover sawlogs after catastrophic events
- Small sales designed to promote research into small-log operations

#### Invasive Weed Species

The policy of the State Forest is to encourage the growth of vegetation that is native to our area and genetically suited for the site. This policy also supports Integrated Weed Management (IWM) as an approach to control vegetation that is not native to the State Forest. IWM management at JDSF will provide demonstration value at multiple scales to a range of customers.

IWM is a prevention-oriented, ecologically based approach to managing weeds cost-effectively with minimal risk to people and the environment. IWM emphasizes control of the environmental conditions that cause or promote weed infestations. IWM includes direct suppression of existing weeds as well as modifying environmental conditions to reduce their suitability for weeds by encouraging the weeds' natural enemies or increasing competition for the scarce resources they require. IWM may make use of the benefits of cultural, mechanical, chemical (herbicides), thermal (fire), biological agents, or other techniques to reduce invasive weed populations and to promote forest health. A premise of IWM is that the most effective means of controlling weeds is



to prevent their expansion into new areas while removing small, isolated infestations before they become problematic.

***Management Goals***

The goals for invasive weed control on the State Forest are to:

- Emphasize the demonstration, and where appropriate, research role of JDSF regarding multiple aspects of invasive weed management on an individual population basis and on a landscape scale. This is intended to ensure IWM at JDSF provides relevant demonstrations at the ecologically appropriate scale as well as providing information pertinent to forest landowners and the public.
- Evaluate strategies for individual invasive plant species and their environmental setting to prioritize treatment. Not all invasive weeds pose the same threat to JDSF. Staff will use an incremental approach to identify and implement successful control strategies, focusing first on protecting higher value resources. Long-term success will be a key measure.
- Detect and directly control potentially damaging new infestations of invasive weeds prior to extensive seed bank establishment. This approach may be instrumental in managing invasive species with substantial local threat but that are not yet widespread. This incorporates consideration of individual invasive species to those at the forest landscape-scale.
- Control existing infestations to minimize conflicts with important management objectives and to maintain natural ecosystem processes. This encompasses demonstrations at project-level scale (i.e. road systems, watersheds or timber harvest plans). The scale will be smaller and limited to experimental plots where more formal research is appropriate. The maintenance of ecosystem processes encompasses recognition of special status plants and unique areas such as Bob Woods Meadow.
- Prevent dispersal of invasive weeds into new areas. This encompasses demonstrations the same range of scales as control stated above.
- Prevent reestablishment of infestations in areas that were formerly infested. This encompasses demonstrations the same range of scales as control stated above.
- Staff will utilize current information pertinent to each specific weed management issue prior to selecting and implementing control methods. To the extent feasible, avoid or minimize the use of chemical (herbicides) weed management tools. See section on herbicides for more detail.

***Planned Actions***

Staff will consider the impacts of invasive weeds to native vegetation during the normal course of project development. If there is a reasonable likelihood of weed spread due to a nearby infestation, mitigation will be considered where appropriate and consistent with IWM to minimize the spread of invasive weeds. Conservation and reestablishment of native vegetation will be considered in disturbed open areas adjacent to forest roads in order to minimize weed spread. For example, conserving both existing overstory and understory vegetation near roads may be an effective preventative measure. Other measures may be used to make roadsides less attractive seedbeds for invasive weeds or increase competition pressures on invasive weed seedlings.

A staff training program in identification of invasive weeds will be implemented. Training topics will include: integrated weed management, the ecological and management impacts of weeds, a weed location reporting system, and the employee's role in weed management.

Weed infestations on the State Forest will be periodically evaluated. Evaluation will include the following factors: weed species, location, probable causes of infestation, control treatments considered or applied, and the effectiveness of the treatments.

The spread of invasive weeds is a shared concern by many individuals and organizations within Mendocino County. JDSF will cooperate with local, state and federal agencies, forest landowners, private organizations (e.g., Pacific Gas and Electric Company) and public organizations [California Native Plants Society, California Invasive Plant Council and the Mendocino Coast Weed Management Group (CDF is a signatory member of the latter group)] to work towards control of invasive exotic weeds.

State Forest Staff will make an effort to identify post-harvest emerging weed populations during periodic examinations of harvest units and forest roads coincident with erosion control and forest stocking inspections. Treatment decisions will be made within the context of IWM goals.

JDSF, as one of the project initiators, will continue to support the International Broom Initiative to investigate biological control agents for French broom, Scotch broom, Spanish broom, Portuguese broom, and Gorse. The Commonwealth Scientific and Industrial Research Organization of Australia, U.S. Department of Agriculture, Cal-IPC and the State Forest are cooperators in developing environmentally safe biological control agents for these weed species.

Staff will increase their knowledge base of invasive weed species currently infesting, or potentially infesting the Forest. The "California Invasive Plant Inventory" compiled by the California Invasive Plant Council can be used as an aid for identifying weeds species of concern. Invasive weeds of particular concern at JDSF currently include: French broom, Scotch broom, gorse, jubata grass (pampas grass), yellow star thistle, cape ivy, blue gum eucalyptus, and English ivy.

**Herbicides**

CDF and the BOF recognize there is public controversy regarding herbicide use. A total ban on herbicide use would compromise research opportunities and the broad demonstration value of the Forest and could result in adverse environmental and economic consequences. JDSF staff will adopt the following limitations to potential herbicide use:

- Seek opportunities to research and demonstrate a range of vegetation treatments so that local information is available on vegetation treatment options. Emerging treatment methods may have undesirable operational or environmental limitations. These efforts will help JDSF and others understand these treatments in the context of the local environment and forest landscape and develop viable non-herbicide treatments.

- Use herbicides only after consideration of the scope of the problem, opportunities to effectively manage the situation, and available alternatives and their potential effectiveness and costs.
- No herbicide will be used unless it is integral to long-term, ecological based management. Projects will be proactive rather than reactive. These considerations will limit and focus any herbicide use. Long-term management will often integrate a variety of treatment techniques.
- Public and environmental safety is a priority. When herbicide use is indicated, JDSF staff will reduce risk by selecting appropriate herbicide formulations and application techniques.
- Recognize that some forest visitors may experience negative aesthetic reaction to dead treated plants, even if they are invasive weeds. Herbicide use will be evaluated for aesthetics where treatments could have this potential effect.

This plan limits the types of vegetation management that would be considered for herbicide use. Herbicides will not be used for roadside vegetation clearance to treat native vegetation, unless there are significant over-riding management concerns specific to the area, such as fire prevention. Additional guidance for potential consideration of herbicides use for restoration of historic conifer/hardwood ratios or for reforestation has been discussed in this chapter under Timber Sales.

#### Riparian, Wetland, and Floodplain Management

The goal of the prescriptions developed for the JDSF Management Plan related to watershed and fisheries values is to maintain or enhance important habitats for both anadromous and resident fishes found in JDSF and promote healthy and sustainable aquatic ecosystems. Specifically, properly functioning riparian and stream ecosystems will be protected or restored by managing forest stands in watercourse and lake protection zones (WLPZs) to promote their ecological succession to late seral forest conditions. Development of vertical structural diversity in these stands will be facilitated. A key overall management objective for in-channel areas is to increase the abundance and improve the distribution of key pieces of large woody debris (LWD). Streamside overstory and understory riparian trees in the WLPZ will provide sufficient canopy to avoid or minimize impacts to stream temperatures. Bank stability will be promoted by retaining vegetation, establishing equipment exclusion zones (EEZs) or equipment limitation zones (ELZs) along watercourses, and prohibiting ignition of prescribed fire near watercourses. Since JDSF is a publicly owned property available for research purposes, protection measures assigned to riparian areas are to remain sufficiently flexible for conducting research on the adequacy of differing riparian protection measures.

Wetland habitats on JDSF will continue to be managed in a manner that maintains or restores productivity and contributes to fish and wildlife habitat, water quality, and ecological functions and processes. The wetlands of JDSF are small in extent, but of high interest and value. They include two known Sphagnum bogs<sup>8</sup> and numerous springs and seeps with aquatic habitat values. Wetland habitat quality and hydrologic function will be protected.

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<sup>8</sup> A sphagnum bog is an acid freshwater bog containing abundant sphagnum (moss), which may ultimately form a deposit of sphagnum peat.

**Floodplain Management Measures**

Where there is evidence of floodplain connectivity for storm events with return intervals of 20 years or less in areas that are proposed for timber management, Forest staff will utilize the guidelines stated in "Flood Prone Area Considerations in the Coast Redwood Zone" (November 2005). In addition, Forest staff will be guided by the evaluation procedures included in the Riparian Protection Committee's Final Report.

**Water/Lake Protection Zone Measures**

Due to both the research and demonstration mandate for JDSF and the need for flexibility based on site-specific requirements, a range of possible riparian prescription measures will be possible. These include the following management measures (partially based on the approved BOF July 2000 Threatened and Impaired Watersheds rule package):

1. Class I – 150 foot WLPZ; class II – 50 to 100 foot WLPZ. Zone widths are to be expanded where appropriate (e.g., unstable areas, etc.). Both the Class I and II WLPZs will be managed to create late-seral forest characteristics.
2. Timber operations within channel migration zones will not occur (except as allowed in the Forest Practice Rules).
3. Class I inner band– 25 feet wide beginning at the watercourse transition line: No-cut (except for harvest of cable corridor trees where needed) or limited entry to improve salmonid habitat through use of selection or commercial thinning silvicultural methods. At least 85 percent overstory canopy (where it exists prior to harvest) is to be retained within 75 feet of the channel.
4. Class I outer band– 125 additional feet: High basal area and canopy retention zone. Basal area retention will remain high through the use of single tree selection silvicultural systems. Vertical overstory canopy (measured with sighting tube) at least 70 percent (where it exists prior to harvest) is to be retained in the outer band.
5. Class I/II: Ten largest conifers per 330 feet of stream channel retained within 50 feet of the watercourse transition line.
6. Class II inner band– 25 feet wide beginning at the watercourse transition line: No-cut (except for harvest of cable corridor trees where needed) or limited entry to improve salmonid habitat through use of selection or commercial thinning silvicultural methods. At least 85 percent overstory canopy (where it exists prior to harvest) is to be retained within 25 feet of the channel.
7. Class II outer band – remainder of WLPZ (25 to 75 additional feet): High basal area and canopy retention zone. Basal area retention will remain high through the use of single tree selection silvicultural systems. Overstory canopy will be retained to prevent water temperature increases and allow for adequate canopy recovery where required.
8. Within Class I and Class II WLPZ, retain a minimum of 240 sq. ft. conifer basal area following completion of timber operations.
9. Reentry - No more frequently than every 20 years for Class I WLPZs.
10. Class III – Equipment Limitation Zones (ELZs) will be at least 25 feet on side slopes less than 30 percent, and 50 feet on slopes greater than 30 percent. These zones will be expanded where site-specific investigations reveal that additional protection is merited for preventing sediment movement into class III channels.

11. Class III – Burning will be conducted so that the majority of large woody debris is left within the ELZ. Fuels are not to be ignited within 50 feet of Class III channels.

To further facilitate recovery of aquatic resources and habitats, the December 2005 DEIR added the Large Woody Debris Survey, Recruitment, and Placement Additional Management Measure (see Appendix X).

#### Hillslope Management to Provide for Slope Stability

Forest management activities with the potential to destabilize slopes and/or damage aquatic habitat will be mitigated to help maintain stability of hillslope areas and control sedimentation. Special attention will be given to areas where mass wasting tends to occur. Site specific measures will be developed and applied in THP design and implementation for potential high hazard areas. The goal is to limit management related input of sediment into stream channels that could significantly affect aquatic habitat and water quality.

Inner gorge and unstable areas will be identified during initial THP preparation with a map and field review. A Certified Engineering Geologist (CEG) will be consulted for appropriate measures needed to avoid or minimize impacts where timber harvesting is proposed within the inner gorge, and when appropriate for proposed timber harvesting and use of ground-based equipment within unstable areas. While potential inner gorge areas for JDSF have been mapped by the California Geologic Service (largely from aerial photographs), they will be field verified prior to logging. Road construction and ground-based yarding activities in inner gorges will not take place without CEG advice.

Where road building is proposed in potentially unstable areas, the Registered Professional Forester (RPF) will seek the advice of a CEG. Appropriate prescriptions will vary depending on the site-specific conditions present. Where timber harvesting is allowed in these areas, silvicultural restrictions may apply.

Specific slope stability assessment techniques to be used as part of the JDSF Management Plan include:

- a) Office Review of Existing Information. This information includes: 1) Maps of geologic and geomorphic features related to landsliding, 2) Relative landslide potential maps (see Map Figures V and W in the December 2005 DEIR) and 3) prior THPs and their geologic reports.
- b) Field Review. Once office review has been completed, an on-site evaluation will be conducted throughout the project area by a Registered Professional Forester (RPF). Areas highlighted during the office review of existing information will receive special attention. The RPF will follow the 1999 "California Licensed Foresters Association (CLFA) Guide to Determining the Need for Input From a Licensed Geologist During the THP Preparation." (Appendix IX)
- c) CEG Input. A CEG is to be consulted as appropriate during the design phase of timber sale preparation work to address slope instability and erosion issues identified during office and field reviews, insuring that harvest units and road designs are proposed that adequately protect unstable areas and inner gorges. The 1999 CLFA guide will be used to aid in determining when to call for the services of a CEG.

The December 2005 DEIR includes two mitigations to be applied on JDSF to address the Management Plan's potential significant adverse impacts related to (1) landslides and (2) location on unstable geologic unit or soil. These are included in Appendix X.

### Water Quality

Water temperature and sediment issues are the major water quality concerns for the watersheds occupied by JDSF. Sediment issues are the main focus of this section.

At the broadest level of water quality protection, JDSF staff will protect the beneficial uses of water by compliance with water quality objectives in accordance with the Water Quality Control Plan for the North Coast Region (Basin Plan), and by implementing required TMDL measures. JDSF staff also will comply with other relevant regulations of the North Coast Regional Water Quality Control Board, including the Anti-degradation Policy, TMDL Implementation Policy statement, the Nonpoint Source Policy, and other relevant current regulations, as well as any additional relevant regulations that may be implemented over time.

### **Sediment and Turbidity in General**

Reducing suspended sediment concentrations and lowering turbidity in waters flowing from JDSF are high priorities for this management plan. This goal relates to both drinking water standards and maintenance of a healthy aquatic habitat for anadromous fish. For example, the enforceable regulatory levels under the Safe Drinking Water Act require that all public drinking water systems not exceed the maximum contaminant level for turbidity of 5 mg/l, or approximately 5 nephelometric turbidity units (NTUs) (CDHS 1999). Laboratory data have shown that chronic turbidity levels of 25 to 50 NTUs can cause a reduction in coho salmon and steelhead trout growth (Sigler et al. 1984).

Data from the Caspar Creek watershed study shows that over the 1996 to 1999 hydrologic years, the North and South Forks have averaged 17 and 19 days over 40 NTUs each year, respectively (J. Lewis, USFS, Pacific Southwest Research Station, Arcata, CA, written communication). Turbidity levels exceeded 100 NTUs in the North and South Forks approximately 3 and 5 days, respectively, each year. It is likely that several of the planning watersheds in the western portion of JDSF have generally similar numbers of days with elevated turbidity levels.

The City of Fort Bragg's water supply intake on the Noyo River consists of a direct diversion system installed in 1992 and a Ranney infiltration gallery system built in 1982. The latter system has perforated pipe buried in 8 feet of gravel in the river bed. The Ranney system has experienced considerable problems due to sealing of the bed surface by fine sediment, hence the development of the direct diversion system. The Ranney system is still used, however, when winter turbidity levels in the river exceed 80 to 100 NTUs (Ted Steinhardt, City of Fort Bragg, Water Plant Manager, personal communication). City of Fort Bragg records indicate an increase in turbidity levels in the mid-1980's to early 1990's, with water quality improving considerably in the past 10 years. Turbidity levels are currently much like they were in the late 1970's to early 1980's. Summer turbidity levels average approximately 0.8 NTUs, while winter turbidities average about 15 NTUs. Normal winter storms elevate turbidity levels to about 70-80 NTUs, with spikes well into the 100's of NTUs. Ideally, untreated water being diverted from the Noyo would have a turbidity level of less than 10 NTUs during the winter months.

More extensive and detailed discussions and analysis of turbidity, suspended sediment, and sediment sources, including more recent data, can be found in the December 2005 DEIR. Relevant sections of that document include sections VII.6.1 Aquatic Resources, VII.10 Hydrology

and Water Quality, Appendix 10 Peak Flow Analysis, Appendix 11 Overview of Existing Sediment Studies Relevant to the JDSF DEIR, and Appendix 12 Stream Temperature.

The primary techniques that will be used to reduce turbidity and suspended sediment concentrations in JDSF watercourses will relate to improved practices associated with road maintenance and timber operations. As discussed in the watershed current conditions portion of this document (Chapter 2), road related surface erosion is estimated to account for half of the sediment generated within the 15 planning watersheds draining JDSF. Implementation of the Road Management Plan is expected to significantly improve water quality. Specific items that will reduce turbidity and suspended sediment concentrations include: hydrologically disconnecting inside ditchlines along road segments from watercourses and other road upgrading actions, reducing winter hauling on wet roads, properly abandoning roads located near watercourses, and use of annual inspections of roads to improve road maintenance. In addition to road management actions, improvements associated with hillslope operations will reduce sediment entry into watercourses. These practices include reduced tractor logging on steeper slopes, better recognition and mitigation measures for unstable slopes and inner gorge areas, and use of wider equipment exclusion zones—keeping ground disturbing activities further away from stream channels.

#### Specific Approaches to Addressing Sediment-Related Water Quality

**Roads** - *refer to the Road Management section in this chapter, above, and Appendix V.*

#### **Riparian Zones**

Watercourse and lake protection zones are to be managed to provide high levels of large wood input for fish bearing waters. See further discussion of this issue in this chapter, below, in the section, Fish, Wildlife, and Plants.

In those areas where channel (migration) zones exist, harvesting is to be excluded from the floodplain area, except as necessary to conduct upslope harvesting operations. [Channel zone, as defined in the Forest Practice Rules, means the area that includes a watercourse's channel at bankfull stage and a watercourse's floodplain, encompassing the area between the watercourse transition lines.]

Bare soil surfaces associated with management disturbances within WLPZs and ELZs that exceed 100 square feet are to be mulched to achieve at least 95 percent coverage to a minimum depth of four inches where there is potential for soil detachment and transport.

#### **Watercourses**

Large woody debris can play an important role in storing sediment and metering sediment movement in streams. Large woody debris may be added to fish bearing waters found to be deficient in wood loading. This work, to be conducted with a research and demonstration function, is to be coordinated with the California Department of Fish and Game and other relevant agencies and interested parties. Three Riparian Restoration Demonstration Areas have been designated on Figure 5 for experimentation including the LWD loading of streams. LWD measures are detailed elsewhere in this chapter and in the section Fish, Wildlife, and Plants, below.

Watercourse crossings are to be inventoried to insure that adequate fish passage is present; problems are to be corrected as needed.

Watercourse crossings are to be inventoried to locate high-risk crossings; identified crossings are to be upgraded or abandoned.

New and replacement watercourse crossings are to be sized for 100-year discharge events, as well as for passage of woody debris and sediment.

Adequate protection (i.e., Class II watercourse protection measures) is to be provided for seeps, springs, and small class II watercourses.

Water drafting specifications according to the Forest Practice Rules are to be used during timber operations.

### **Hillslopes**

Areas with a high relative landslide hazard potential, including inner gorges are to be evaluated in proposed timber sales (see also the Hillslope Management to Provide for Slope Stability section of this chapter, above).

Aerial yarding systems (e.g., skyline cable, helicopter) are to be utilized where possible and on slopes steeper than 40 percent.

A CEG is to be consulted as appropriate during the design phase of timber sale preparation to insure that harvest units and roads are proposed that adequately address unstable areas and inner gorges.

Winter period timber operations (November 15 to April 1) are to be avoided, except for timber falling and erosion control maintenance unless specifically developed to accommodate winter operations.

### **Water Temperature**

The main controllable factor with respect to water temperature is the amount of canopy cover over streams and the adjacent areas. JDSF management will protect and enhance water temperature parameters by maintaining a high level of canopy cover over streams and adjacent areas. This will be accomplished by managing the WLPZs for Class I and II streams for the development of late seral forest characteristics. The specific measures that will be applied for WLPZ protection and enhancement we previously detailed earlier in this chapter, in the section Riparian, Wetland, and Floodplain Management.

A second means of protecting and enhancing water temperature parameters is through the enhancement of deep pools that store cool water and provide refugia for fish. The measures contained in the Management Plan for recruiting and placing large woody debris in streams will provide important structural elements that support pool formation, hence cooler water temperatures. LWD measures are detailed elsewhere in this chapter, in the section Riparian, Wetland, and Floodplain Management (above) and the section Fish, Wildlife, and Plants, below.



**Fish, Wildlife and Plants**

The overall objective for fish, wildlife and other non-timber resources is to manage habitat, habitat elements, and uncommon forest attributes. Discussed here are the principal areas of concern and proposed management direction. Jackson Demonstration State Forest, given its geographic location, vegetation types, and demonstration mandate, is in a unique position to develop habitats that contribute to improvement in the population viability of certain species of concern and to protect or restore other forest values. Opportunities exist for habitat restoration and management for species that may or may not presently occur on the forest. Similarly, efforts to control the establishment and spread of invasive weed species will contribute to the protection of biological diversity from both a local and regional perspective.

The measures that follow represent generally accepted habitat and species conservation practices that may be modified where appropriate for research and demonstration purposes where they are supported by experts in the field, undergo appropriate CEQA analysis, and include appropriate survey, study, and monitoring.

**Protection and Enhancement of Aquatic Organisms and Associated Habitat**

The FMP has been developed to achieve desired future conditions that will provide site- and species-specific protection measures that contribute to maintenance or improvement of the long-term conservation of population viability of aquatic and riparian dependent species of concern and enhance habitat values over existing conditions. Individual project stream and riparian protection and management measures will be determined on a site-specific basis and be designed to attain or maintain properly functioning condition while implementing the following protection measures.

The goal of the JDSF riparian and stream management program is to maintain "properly functioning" riparian and stream ecosystems, i.e., systems that provide essential ecological function. JDSF's management strategy will go beyond simply preventing significant detrimental effects to aquatic and riparian habitats. The goal is to ensure that the aquatic and terrestrial resources and the ecological functions of riparian areas are protected and improved or restored. JDSF will manage forested stands in water/lake protection zones (WLPZs) to promote their development to late-successional forest conditions. JDSF will retain and enhance the vertical structural diversity of these stands, and protect riparian zone special habitat elements such as snags and large woody debris (LWD) to improve habitat values.

Stream and riparian protection and management measures will be determined on a site-specific basis. A variety of conservation measures are available to avoid degradation and improve aquatic and riparian habitat. For example, large woody debris may be recruited to the stream through undisturbed buffer strips, retaining a predetermined number of trees, rotation age adjustment, or silvicultural control of recruitment rate and the species mix of trees. In order to develop an integrated conservation approach it is necessary to identify stream and riparian conditions that may already be degraded and could be affected by planned operations. As these areas are identified, measures will be developed that are intended to improve conditions, especially in regard to LWD loading.

**Wetlands**

JDSF will manage wetland habitats in a manner that maintains or restores productivity and contributes to aquatic habitat, water quality, and ecological functions and processes. JDSF will protect wetland site integrity and hydrologic function.

**Riparian Zones**

Riparian areas along streams and rivers are among the most ecologically important elements of forest landscapes. Forests have a range of functional links to streams and rivers, including providing energy, nutrients, and coarse woody debris. Along smaller streams, forest conditions also strongly influence light and temperature conditions. The stability, or lack thereof, of the soil and rock underlying the forest also controls the level of fine sediments, gravel, and boulders that enter the stream system and create much of the streambed structure.

The goal of the JDSF riparian and stream management program is to maintain "properly functioning" riparian and stream ecosystems, i.e., systems that provide essential ecological function. Management measures and discussion of riparian zone management can be found in the previous section of this Chapter (Riparian, Wetland, and Floodplain Management) and in Appendix X for a complete description of protection measures for riparian areas. Additional specific aspects of the management strategy previously discussed concerning aquatic organisms and their habitat are detailed in the sections that follow.

These habitat protection measures will be implemented within riparian zones to promote and protect riparian ecosystem function:

- Natural springs and seeps that may provide habitat for non-fish aquatic species are provided the same protections as Class II streams.
- LWD within the WLPZ will be retained and recruited to the stream system unless it presents an imminent risk to safety or drainage structures.
- The Road Management Plan will be implemented to minimize delivery of road-related sediment to aquatic habitats and facilitate fish passage at Class I and II road crossings.
- Selected roads within the WLPZ will be abandoned and decommissioned as described in the Road Management Plan. Construction and abandonment will be consistent with the standards described in the Road Management Plan.
- Road construction and harvesting proposed in inner gorge areas may be approved only after conferring with a Certified Engineering Geologist.
- Fish passage at Class I crossings will also be assessed and addressed as needed.

**Large Woody Debris Survey, Recruitment, and Placement**

The recruitment of LWD to the stream environment over time and consequent influence on the formation of pool habitats is also achieved through a variety of other habitat conservation strategies. In addition to the management measures listed above, the following strategies will be applied where they overlap with stream environments:

- Retain native hardwoods in the WLPZ except where species imbalance has occurred.
- Old-growth groves and residuals are protected per the JDSF old-growth conservation strategy.
- Salvage of dead or dying trees will not occur within the WLPZ, old-growth augmentation area, species-specific management area described in a habitat conservation strategy, or

other area specifically identified. Exceptions may exist in response to large-scale occurrence of fire, insect attack, windthrow, or threat to infrastructure.

Please see Appendix X for an additional management measure related to large woody debris, originally developed as part of the DEIR.

#### Protection and Enhancement of Wildlife Species, Habitat, and Forest Structure

The wildlife management objectives of the Forest are to protect or improve current populations and habitat by maintaining a diverse, dynamic matrix of forest habitats and seral stages suitable for a wide variety of native wildlife populations. Manage designated old growth reserves for maintenance of late seral habitat values. Maintain and recruit structural elements necessary for properly functioning habitats. Management goals and direction are intended to initiate a trajectory of management that will result in about one-third of the Forest area being in older forest structure, late seral forest, or old growth.

#### **Recruitment of Late Seral Forest**

Management areas have been designated adjacent to three existing old-growth groves or complexes [Road 334 Grove (an additional 492 acres), Waterfall Grove complex (an additional 250 acres), and Upper James Creek Grove (an additional 38 acres)] to provide for the recruitment of additional late seral forest stands. These management areas will receive the same site-specific protection measures (i.e., special silvicultural management zones) as the old-growth grove reserves when THPs occur adjacent to these areas. These protection measures will increase the ecological values of these groves as habitat for marbled murrelet and other species, and help buffer the groves from various types of disturbance.

Late seral forest characteristics will also be managed for in the Mendocino Woodlands Special Treatment Area (2,224 acres located in the Lower North Fork Big River planning watershed excluding the Railroad Gulch Research Area). Management in this area may include thinning from below and individual tree selection designed to emphasize development and retention of large trees.

An additional area that encompasses part of the Russian Gulch and Lower Big River watershed (1,350 acres) has been designated for marbled murrelet habitat recruitment/late seral development. This area has important habitat potential due to its close proximity to the coast, State Park lands (Big River and Russian Gulch), and the Mendocino Woodlands Special Treatment Area (discussed above).

Where timber harvest is proposed near old-growth groves or late seral development areas, a buffer will be applied. No even-aged silvicultural systems may be used within 300 feet, and only single tree selection may be used within the first 100 feet adjacent to these areas.

The WLPZs on Class I (150-feet wide) and Class II (100-feet wide) streams will be managed for the development and maintenance of late seral forest characteristics. These areas cover approximately 7436 acres.

Portions of other special concern zones may have designated areas where silvicultural activity will not occur. This management will allow for the recruitment of large trees that may develop the structural characteristics commonly associated with old-growth trees.

JDSF intends to recruit trees with late seral or old-growth characteristics in areas that enhance the ecological effects of forests with these structural characteristics. Trees with old-growth or late

seral characteristics cannot be recruited during the life of the management plan. However, second-growth trees, over time, can be allowed to grow to develop structural characteristics similar to old-growth trees. The JDSF Management Plan makes a commitment to manage identified forest areas to achieve that goal in as short a time frame as possible.

### **Older Forest Structure Zone and Corridor**

To provide for an extensive corridor or older forest structure across the Forest, from west to east and north to south, an older forest structure zone (OFSZ) has been designated. This corridor is indicated in Figure 5. The OFSZ corridor connects most of the old-growth groves and late seral development areas on the Forest. The OFSZ and its management has already been described earlier in this chapter in the section Structural Conditions Related to Late Seral, Watercourse and Lake Protection Zone Areas, and Older Forest Structure Zone Area.

### **Old Growth Forest**

Existing old growth groves will be retained, as will aggregations of old growth trees. Individual old growth trees found outside of stands or aggregations and exhibiting specified characteristics will be retained, with limited exceptions, such as where the tree presents a public safety issue or retention would result in the potential for greater long-term environmental damage. Old growth retention and recruitment measures are presented below. In addition, refer to DEIR section VII.6.3 Timber Resources for a discussion of the old growth protection measures.

### ***Old Growth Management Objectives and Definitions***

The management objectives for old-growth stands and trees are to:

- Protect existing old-growth groves and improve their value as wildlife habitat, and manage selected second-growth forest stands for old growth and late seral attributes.
- Retain small aggregations within larger young-growth stands to maintain and enhance the ecological value of these stands for native species.
- Retain individual trees not found in groves or aggregations that are identifiable as old-growth trees based on specified characteristics...

An old-growth conifer tree is any live conifer, regardless of size or species that was present in the original stand before the first historic logging on JDSF (1860), based upon the professional judgment of JDSF staff. Characteristics often found in old growth trees that can help identify them are:

The bark is more deeply furrowed and more weathered on old growth trees than on young growth trees, often having a plated appearance. Bark scorching may be heavier on old growth trees, indicating that they were present during fires that occurred before the first logging in the Forest. A tree size that is larger than would be expected for the stand age, management history, and site quality may indicate an old growth tree. Limbs often significantly larger in diameter than expected for the stand age, site quality, and canopy closure may indicate an old growth tree. Limbs often extend from the trunk at more of a downward angle than is common in younger trees.

Old-growth conifers that also have one or more of the following structural characteristics will be retained unless specified otherwise in the Plan:

- a) DBH greater than 48 inches.
- b) Goose-pen (an opening one foot or more in diameter inside and above the top of the trunk opening).
- c) Platform branches greater than 8 inches in diameter.
- d) Exfoliating flanged bark slabs.
- e) Chimney top (hollowed upper stem)
- f) Dead top at least 16 inches in diameter and 16 feet long.

#### Guidelines for Protecting Old Growth Trees and Reserves

Old growth conifers with any of the attributes described in a. through f. above will be retained in any prescription unless the tree presents a public safety issue or retention would result in the potential for greater long-term environmental damage, including but not limited to issues related to road and landing sites, soil instability, damage to aquatic resources, or cable yarding requirements.

Since it is often difficult to visually distinguish between young growth and old growth hardwoods, size will serve as a surrogate for age. All hardwoods 36" DBH + will be considered for retention, as will other hardwoods that appear to be old growth and possess characteristics similar to those in a. through f. above. Where forest stands appear to have greater hardwood site occupancy than in the past, hardwoods of any age may be removed to restore former species balance, favoring old growth hardwoods for retention whenever appropriate.

Known old growth stands have been identified and will be retained. Some of these old growth stands are to be augmented with surrounding late seral development areas to enhance their function and value to wildlife.

#### **Old Growth Aggregations**

An old growth aggregation is defined as an obvious, intact, undisturbed remnant of the original stand, with an area of at least two acres. Delineating the boundary of an aggregation will be guided by the principle that a gap of 200 feet or more between trees breaks the continuity of a potential aggregation. No trees, young or old, shall be designated for harvesting in an old growth aggregation, except as necessary for the construction or use of truck roads, landings, skid trails, cable corridors, tail holds and guy anchors needed for timber harvesting. All identified aggregations will be mapped. No old growth trees within aggregations will be removed unless the tree presents a public safety issue or retention would result in the potential for greater long-term environmental damage, including but not limited to issues related to road and landing sites, soil instability, damage to aquatic resources, or cable yarding requirements

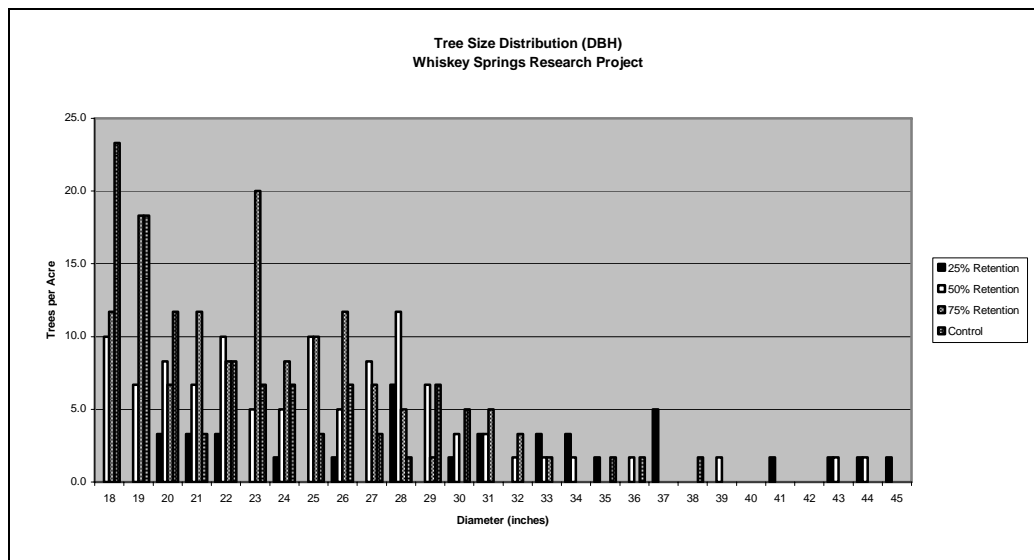
#### **Structural Retention and Restoration**

At the time of a timber harvest, the retention of existing stand elements for inclusion in the replacement stand provides a refugia and inoculum for the re-establishment of organisms. This is accomplished through the use of live and dead elements in various spatial configurations (i.e.,

dispersed or aggregated). Structural elements include snags, downed logs, and live trees of varying sizes. This approach is increasing and is a high priority for research associated with the habitat value associated with a range of habitat elements and spatial arrangements.

Structural restoration represents management activity intended to accelerate the development of complexity in structurally simple stands. The retention of existing old growth groves provides a baseline for measuring complexity. This needs further characterization. The older forest structure zones and blocks adjacent to parks and large corridor units are priority candidates for structural restoration. Some of these elements are discussed below. Basal hollows is another element that has received some study on the forest (Mazurek and Zielinski 2004). The efficacy of basal hollows in improving habitat is deserving of additional study as are methods to create these structures in the absence of wildfire.

The ability to influence structural restoration through management is illustrated by the following figure. By reducing redwood density through thinning, biomass was concentrated on fewer trees resulting in substantially larger trees within a few decades (Lindquist 2004).



### Snag Retention and Recruitment

Snags are standing dead trees that provide important structural components of the forest ecosystem. Wildlife species use of snags varies from incidental use to dependence. In modeling wildlife habitat dependence in Mendocino County, the Wildlife Habitat Relationship results indicate that 90 vertebrate species prefer or require snags to fulfill a portion of their life history needs (2 species of amphibians, 54 birds, and 36 mammals) (CDFG 1996).

Snag diameter influences its longevity and value to wildlife. The minimum size that provides value to most wildlife are dead trees greater than 11 inches in diameter at breast height (DBH) and 12 feet or greater in height. (Thomas et al 1979). In general, larger snags provide better habitat than smaller snags because they last longer (before they decay and fall), provide better thermal cover, and accommodate a more diverse spectrum of wildlife species.

All snags will be retained within all timber harvest areas with the exception of snags that pose a fire or safety hazard, or are within the alignment of roads proposed for construction.

A goal for the entire forest is to attain one snag per acre (on a 160-acre sub-watershed scale) that is at least 30 inches DBH. The desired future condition for snags in all wildlife special concern

areas is to have three snags per acre, of which two are at least 20 inches DBH and one is at least 30 inches DBH, averaged over a 160-acre sub-watershed area. Periodic sampling will be utilized to monitor snag density, as part of the CFI inventory system.

Snags will be unevenly distributed across the forested landscape in both riparian and hillslope areas. The distribution pattern of snags will include grouped and scattered single trees. JDSF also will recruit snags through indirect measures, such as retention of larger conifers (at least 30 inches DBH) in select areas to provide wildlife habitat. Snag retention policies are designed to provide the habitat needed to maintain viable populations of cavity-dependent and facultative snag-using species, and to provide for recruitment of large woody debris on the forest floor.

The December 2005 DEIR provides a mitigation to address potential impacts to snag- and large-woody-debris-dependent species; it has been included in Appendix X.

### **Large Woody Debris on the Forest Floor**

Large woody debris (LWD) includes downed logs, limbs, bark, root wads, and stumps. Lack of LWD on the forest floor can be a limiting factor to habitat use. Past timber harvesting practices have greatly reduced the amount of large woody debris on the forest floor in managed forests. Large woody debris is also an important structural component in aquatic and riparian habitats. The objective of retaining large woody debris on the forest floor is to maintain or enhance wildlife habitat and soil nutrient levels.

JDSF will manage for a minimum of two downed logs per acre that are at least 20 feet in length with a diameter of 16 inches on the large end and one log per acre at least 24 inches in diameter on the large end and at least 20 feet long. Log densities are averaged over a 160-acre subwatershed area. WLPZs and special concern areas will contribute a greater proportion of downed logs.

### **Hardwoods**

JDSF will maintain the naturally occurring hardwood components in riparian stands (WLPZs) and other special concern areas when consistent with the objectives of that area. The goal is to maintain hardwood tree composition at approximately 10 percent (West End) to 15 percent (East End) of the stand basal area. Maintaining and recruiting hardwoods on JDSF, including larger size classes, will enhance not only wildlife species diversity but also forest structural diversity.

### **Snag and Cavity Dependent Species of Concern**

JDSF management objectives are to maintain or increase the number and productivity of these species through forest management practices that enhance nesting or roosting opportunities by providing site and species specific protection measures including the maintenance or development of forest openings as necessary. See Snag Retention and Recruitment and Large Woody Debris on the Forest Floor objectives above.

### Protecting and Enhancing Specific Wildlife Species of Concern

The FMP includes general riparian protection measures for the Yellow Warbler and Olive-sided Flycatcher. The FMP includes specific protection measures for the Northern Spotted Owl, Osprey, Snag and Cavity Dependent Species of Concern, Marbled Murrelet, Northern Goshawk,

Cooper's Hawk, Vaux's Swift, Purple Martin, and Sonoma red tree vole. For other species, JDSF will evaluate the potential for individual land management actions to have a significant impact on listed (rare, threatened, or endangered) species. In those cases where that impact may be significant, appropriate survey and mitigation measures will be implemented. Although individual project circumstances will dictate the procedures to be used to determine degree of project associated impacts, in general, a scoping process followed by surveys and mitigation development will occur. An assessment area that extends beyond the boundaries of the planned activity also may be required for some species. For unlisted species identified as sensitive, evaluation and mitigation practices are likely to vary according to identified need, the current state of species knowledge, and through consideration of input provided by CDFG

## **Species Surveys**

Special status species make an important contribution to forest biological diversity and are addressed in federal and State law and as appropriate through JDSF and THP planning processes. JDSF's objective for long-term special status species management is to determine what forest management objectives are needed to assure long-term conservation. The JDSF management plan outlines programmatic species and/or habitat management protections and management actions to meet that objective. To better identify and conserve species and meet our commitment to maintain biologically diverse and healthy ecosystems, JDSF conducts pre-project species scoping and implements surveys as necessary to assess ecological requirements and species driven management opportunities and constraints.

### **1. Pre-Project Scoping**

Pre-project scoping will occur prior to conducting pre-project focused species surveys. JDSF will engage in a scoping process to identify those special status species likely to occur in the affected environment of a project area and potential risk of negative effects. A variety of sources of information will typically be consulted and contribute to the planning process. These include the California Natural Diversity Database, JDSF GIS database, as well as a variety of completed survey and focused species' inventory and research efforts. The scoping process will evaluate likelihood of species presence, habitat availability, survey methodology and timing, and possible mitigation or opportunities for habitat enhancement. Population density and detectability of the special status species, habitats occupied, and the level of habitat disturbance expected from the land management action guide survey intensity. Current literature and species authorities will be consulted as necessary.

### **2. Training**

JDSF will provide for, on an as-needed basis, a sensitive wildlife identification training program to enhance the ability of field personnel to recognize these resources. Personnel who will be responsible for NSO and MAMU surveys will meet the USF&WS and/or CDFG recommended qualifications for conducting the appropriate survey. JDSF also supports personnel seeking more formal instruction and training in this area.

### **3. Biological Survey**

Surveys conducted for special status animal species, when indicated following pre-project



scoping, will be to established protocols, after consultation with federal or state wildlife management agencies as appropriate, or practices commonly accepted by CDF and CDFG for Timber Harvesting Plan review. In general these species are listed and may be among those considered Species of Special Concern by the California Natural Diversity Database or otherwise recognized by State or federal endangered species acts. Surveys for special status species will include suitable habitat within the proposed project impact area and inquiries regarding occupancy or suitable habitat off-site that may be affected by project implementation. Surveys, irrespective of the state of protocol development, are conducted at a time of year that facilitates positive identification and maximizes the likelihood of contact in the field. Observations of rare, threatened or endangered plants, animals or plant communities will be recorded on Field Survey Forms and copies provided to the CDFG California Natural Diversity Database (CNDDDB). Survey summaries will form the basis for the development of monitoring and adaptive management strategies that may include modification of the nature and location of land management prescriptions.

Management and the analysis of cumulative effects must ultimately shift away from a single-species approach to one that is inclusive of single species and ecosystem structure and function. Concentration on the needs of individual species can result in mis-management of other more common species and their habitat, additional listings, public polarization, and an unstable regulatory environment. In general, it is more efficient to evaluate risk to a species by examining impacts to its habitat, when that information is available, rather than directly counting or modeling population levels over time. Key components of this approach involve a temporal evaluation of amount, quality, and spatial arrangement of habitat. Implementing forest planning with a habitat approach requires descriptions of species-habitat relationships and landscape pattern that capture the diversity within the region (Wildlife/Science Committee 1994). Broad resource assessments and analyses as informed by all-species surveys are an important first level element.

Floristic and faunistic surveys (all-species surveys), as distinct from focal species surveys, can be beneficial to project and species management planning and cumulative effects analysis when sufficiently supported over the long term. These kinds of surveys can help identify unique or previously unknown habitat associations, range extensions, evaluate the likelihood of congeneric species presence, and assist in the validation of species-habitat relationship models. One additional benefit of an all-species survey is that currently common species can be related to habitat measures and form an informational base for the development and validation of spatial habitat relationship models and improved cumulative effects analyses.

Conversely, all-species surveys are beset with many of the same issues as focal species surveys but at a somewhat greater scale and cost, particularly for animals. Variable wildlife migration or activity period, and the variety of survey methodologies required for wildlife species make all-species surveys at any scale relatively problematic and costly. In general, it can be expected that a greater number of surveyor visits will be required to fulfill the objectives of an all-species presence/absence determination. This level of survey also requires a greater level of surveyor biological expertise to achieve desired accuracy and consequently, greater upfront costs over the short-term. In addition, formal listing of a species previously noted in an all-species survey would not obviate additional survey visits for any new project planning and implementation to ensure appropriate protections are put in place. Similarly, floristic survey costs are influenced by the ability and experience of the surveyor, market factors driven by surveyor availability, access, terrain, and vegetation variables and number of visits needed to observe species during the appropriate identification period.

As JDSF rebuilds staff, expertise and research capacity, an improved understanding of biological resources will be built. At this point in time JDSF must rely on current sources of predictive habitat relationship models, occurrence data, and pre-project scoping that is followed by focused

survey effort for special status species as necessary. Included are continued development of a forest GIS database of species occurrence, data capture from prior project survey effort, and forest wide research/survey results completed by other agencies and academia. It is expected that over time and with consistent data capture in JDSF's database that improvement in the predictability of the status and occurrence of special status species will emerge. Floristic and faunistic survey effort to address the occurrence of all-species regardless of status remains a managerial option pending need and resource and personnel availability.

### **Northern Spotted Owl Conservation Strategy**

Forest management objectives for northern spotted owls on JDSF are to maintain or increase the number and productivity of nesting owl pairs through forest management practices that enhance nesting/roosting opportunities and availability of a suitable prey base.

#### ***Habitat Protection***

- Habitat protections provided for existing activity sites are described in detail in the Forest Practice Rules. Activity sites are considered a nest or primary roost site occupied by a pair of birds irrespective of their reproductive success. Activity sites represent a confirmed pair or primary roost site at least one year in three years. Activity sites are protected with a 1,000-foot radius disturbance buffer and other measures to prevent take as described in the Forest Practice Rules.

#### ***Species Protection***

- All proposed timber harvesting plans containing suitable nesting or roosting habitat will continue to be surveyed following established survey protocols endorsed by the responsible state or federal agency.
- All timber operations within the buffer of an active site will occur outside of any seasonal closure to prevent disturbance. The determination of seasonal closure dates to prevent disturbance during the nesting period are described in the Forest Practice Rules (919.9 and 919.10).

#### ***Habitat Management Practices***

- Within 500 feet of the nest site, habitat will be retained as follows: 25 percent of area composed of trees greater than 11 inches DBH and 60 percent or greater canopy cover. 75 percent of area composed of trees greater than 24 inches DBH and 60 percent or greater canopy cover. Trees greater than 24 inches DBH and over a distinct layer of trees of 6-24 inches DBH and greater than 60 percent canopy closure may contribute to the 75 percent.
- Within 500-1000 feet of the nest or roost site habitat will be retained as follows: trees greater than 11 inches DBH and greater than 40 percent canopy closure.
- Within a 0.7-mile radius of the activity site 500 acres of habitat will be provided (inclusive of the 1000 foot radius buffer above).
- Within a 1.3 mile radius of the activity site 1336 acres of habitat will be provided (inclusive of the 0.7-mile radius buffer above).

### **Osprey Conservation Strategy**

JDSF management objectives for osprey are to maintain or increase the number and productivity of nesting osprey through forest management practices that enhance nesting opportunities.

***Habitat Protection***

- Osprey nest trees will be protected with a buffer zone using topography to minimize disturbance to the maximum extent possible. Disturbance buffer location and configuration will be determined in consultation with the California Department of Fish and Game (CDFG).
- A nest site will be considered unoccupied and protection standards do not apply if after a period of 3 years occupancy cannot be documented. However, the nest tree and any associated screen trees will be protected.
- Protect perch, screen and pilot trees identified in consultation with CDFG. These trees will be designated in the interest of long-term occupancy of the territory and not based just on an individual bird's tolerance or accommodation of disturbance.

***Species Protection***

- Nests within the boundaries of the proposed management activity or unit of treatment will be surveyed prior to operations to assess occupancy. These surveys will also be conducted within the largest disturbance buffer established (see below). Nest surveys are defined as two visits of up to 3 hours long to the nest site and distributed across the nesting period to assess occupancy.
- All timber operations within the buffer of an occupied nest site will occur outside of any seasonal closure to prevent disturbance to occupied nests. The critical period that defines seasonal closure dates to prevent disturbance during the nesting period is described in the Forest Practice Rules (919.3(d)(5) as March 1 to April 15, extended to August 1 for occupied nests) unless site-specific conditions warrant otherwise. CDFG will determine the need for modification of seasonal closure dates.
- Disturbance buffers (within which the seasonal closure will apply) specific to management activities will be established per the Forest Practice Rules.
- There shall be no log hauling within 300 feet of an active nest during the nesting and fledging seasons. The log-hauling buffer shall not apply for nest sites within 300 ft of permanent haul roads when there is no other feasible existing haul route available.

***Habitat Management Practices***

- Nests within the boundaries of the proposed management activity or unit of treatment will be surveyed prior to operations to assess occupancy. These surveys will also be conducted within the largest disturbance buffer established (see below). Nest surveys are defined as two visits of up to 3 hours long to the nest site and distributed across the nesting period to assess occupancy.
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There shall be no log hauling within 300 feet of an active nest during the nesting and fledging seasons. The log-hauling buffer shall not apply for nest sites within 300 feet of permanent haul roads when there is no other feasible existing haul route available.

### **Marbled Murrelet**

CDF has identified key areas for assessment of their suitability for current habitat and for future potential marbled murrelet habitat development and species recovery: Russian Gulch, Lower Big River, Mitchell/Jughandle Creek, and lower Hare Creek.

Under an additional management measure developed in the DEIR process, CDF proposes to conduct an assessment to determine which areas offer the greatest potential for current and future Marbled Murrelet habitat (see Appendix X). This assessment will include areas the DFMP already establishes for old growth protection and late seral forest development, as well as the Mitchell/Jughandle Creek and lower Hare Creek areas. The purpose of this new management measure is to ensure that management of JDSF contributes to providing additional suitable habitat that is intended to aid recovery of Marbled Murrelet populations. This assessment process may result in a spatial reallocation of the acreage currently identified for the recruitment of late seral forest conditions and potential Marbled Murrelet habitat. Areas outside JDSF with murrelet sightings and potential to minimize fragmentation and edge effects, corvid (raven) predation, and human disturbance will be included among the factors to guide murrelet habitat emphasis areas. If late seral forest areas are reallocated to improve Murrelet habitat protection and improvement, there will not be a reduction in the total acreage designated for late seral development, and there may be an increase. Any reallocation will be done in a way so as to not compromise other resource protection values provided by the late seral forest allocation contained in the DFMP. Until the assessment is completed, the forest stands within the assessment area consisting of Mitchell/Jughandle Creeks and lower Hare Creek may be managed in a manner consistent with development of late-seral forest characteristics.

CDF proposes to conduct this assessment and potential late seral reallocation during the first 18-24 months of DFMP implementation. CDF would involve relevant wildlife agencies, adjacent landowners such as State Parks, and other interested parties in the assessment process.

Marbled murrelet management issues are addressed with both short- and long-term site- and species- specific protection measures. For the purposes of this Management Plan, potential marbled murrelet habitat is defined as any intact remnant stand of old-growth forest at least two acres in size and 200 feet across, or other forest area agreed upon by consultation between CDF and CDFG.

### ***Short-Term Marbled Murrelet Protection (Conditions are met within the term of the management plan)***

#### **Habitat Protection**

- Augmentation areas composed of second-growth forest have been delineated for three old-growth groves or complexes to enhance functional characteristics, minimize edge and increase size: Road 334 Grove (492 acres of augmentation), Upper James Creek Grove (38 acres of augmentation), and Waterfall Grove Complex (250 acres of augmentation). Additional areas within which murrelet habitat may be developed over time include most of the Mendocino Woodlands special treatment area, the Upper Russian Gulch area, and the Lower Big River area. These areas will be managed to recruit late seral habitat conditions.

### Species Protection

- Surveys to protocol endorsed by CDFG will be conducted on all project sites with potential habitat and include the largest disturbance buffer established (see below) if management activities have the potential to affect occupied marbled murrelet habitat and management activities are to be conducted within the seasonal closure period to prevent disturbance.
- The marbled murrelet breeding season and disturbance seasonal closure is March 24 through September 15. From August 6 through September 15 there will be no operations until two hours after sunrise and no operations within the buffer area after two hours prior to sunset to prevent disturbance to occupied habitat areas, unless protocol surveys document murrelet absence.
- Disturbance buffers (within which the seasonal closure will apply) specific to management activities will be established as follows as measured from the occupied nest site:
  - Blasting operations: one mile.
  - Helicopter use: within 1/4 mile.

### Habitat Management Practices

- CDF will consult with an interagency prescription team that includes representation from the USFWS, CDFG, and CDF to develop further details on silvicultural prescriptions applicable to augmentation, old-growth areas, and the Mendocino Woodlands Special Treatment Area.
- THPs that are proposed adjacent to augmentation areas will provide a 100 to 300 foot special silvicultural zone (single-tree selection managing for large trees) depending on silvicultural prescription adjacent to augmented and old-growth groves. Uneven-aged units adjacent to the augmented groves will receive a 100-foot special silvicultural zone; even-aged units will receive 300 foot special silvicultural zone.
- Special silvicultural zones will be subject to harvest activities but only during times outside of the seasonal closure for disturbance or if protocol surveys document the absence of murrelets.

### ***Long-Term Marbled Murrelet Protection (Conditions are not fully met within the term of the management plan)***

As discussed above in the section Recruitment of Late Seral Forest, several areas of JDSF will be managed as late seral forest development areas to, in part, over time recruit potential habitat for the marbled murrelet. Similarly, Class I and Class II WLPZs will be managed to create late seral forest characteristics over time, thus also recruiting potential murrelet habitat.

### **Northern Goshawk and Cooper's Hawk**

The northern goshawk is not currently known to inhabit JDSF or adjacent lands, but may be present.

### ***Species Protection***

- Northern goshawk and Cooper's hawk surveys will be conducted in potential habitat areas subject to timber management activity and include the largest disturbance buffer to be established for that management activity (see below).
- Occupied northern goshawk nest sites and associated habitat (including perch, screen, and pilot trees) will be protected and mapped when the species is located during Timber

Harvesting Plan preparation or other project surveys. The area protected will include the nest site (100 acres) and Post Fledging Area (PFA) (300 acres). Cooper's hawk nest sites will be provided protections after consultation with CDFG.

- All timber operations will occur outside of any seasonal closure to prevent disturbance to active sites. The critical period that defines seasonal closure dates to prevent disturbance is described in the Forest Practice Rules (919.3(d)(4) March 15-August 15) unless site-specific conditions warrant otherwise. CDFG will determine the need for modification of seasonal closure dates and those required for Cooper's hawk.
- Disturbance buffers (within which the seasonal closure will apply) specific to management activities will be established in accordance with the Forest Practice Rules.
- CDFG will be notified when nesting northern goshawk or Cooper's hawks are detected to facilitate enforcement of falconry laws.

#### ***Habitat Management Practices***

- Vegetation structure of an active northern goshawk nest site and post fledging area (PFA) will be managed outside of the seasonal closure established for disturbance to attain the following structural characteristics:
- Nest Site: for goshawk nest sites maintain CWHR 5D or 6 (if not available, then CWHR 4D) or other condition derived by an interagency prescription team that includes representation from CDFG and CDF.
- PFA: interagency prescription team will meet to develop details on silvicultural prescriptions to be applied.
- Vegetation structural stage objectives for nest site and PFA conditions may be altered under an adaptive management approach as additional data is acquired regarding northern goshawk habitat requirements in redwood and Douglas-fir forests.

#### **Vaux's Swift and Purple Martin**

##### ***Habitat Protection***

- Retain trees exhibiting cavities considered suitable for Vaux's swift and purple martin that do not interfere with the development of required forest infrastructure.
- In even-aged regeneration silvicultural treatments (including clearcut, shelterwood, seed tree seed step, and shelterwood or seed tree removal) and group selection, all snags will be retained unless representing a worker safety or fire control issue.

##### ***Habitat Management Practices***

- Within the WLPZ, recruit snags by retaining large fir trees as a stand component.
- Salvage of dead or dying trees will not occur within the WLPZ, old-growth augmentation area, species specific management area described in a habitat conservation strategy. Exceptions may exist in response to large-scale occurrence of fire, insect attack, windthrow, or threat to infrastructure.
- Snags reflective of the range of conifer species present will be recruited within or nearby even-aged and small group selection areas. Snag recruitment trees will be clustered if practicable specifically in areas that are considered important to purple martin: ridge lines, adjacent to ponds or other natural forest openings, or areas of prevailing wind.

#### **Sonoma Vole**

Sonoma vole management issues are specific to the maintenance of habitat connectivity and forest tree species composition.

***Habitat Protection***

- Potential habitat is defined as those areas that are at least 40 percent forested by trees greater than 11 inches DBH, 60 percent canopy closure and a high proportion of Douglas-fir.
- Management will maintain a significant area of potential habitat in a connected state with a significant component of Douglas-fir. It is anticipated that uneven-aged management, stream zones, and other connected patches of timber meeting the potential habitat definition will accomplish this goal.

***Species Protection***

- CDF will encourage a research effort to examine Sonoma vole habitat, seral stage use and habitat connectivity requirements in JDSF and adaptively manage for the species based on results.

***Habitat Management Practices***

- Each planning watershed will maintain a significant Douglas-fir component.

Protection of Unique Habitats

**Pygmy Forest**

JDSF will maintain the current distribution and species composition of this plant community and protect it from harmful human disturbance, while continuing to allow compatible recreational activities. Sphagnum Bogs will be protected due to their location within the Pygmy forest and their wetland status.

In addition, Cypress Groups, elements of bishop pine/pygmy cypress forest on unproductive soils (non-timberland) will not be subject to harvest. Note that both these species can occur on disturbed more fertile redwood forest. In these areas (i.e. timberland) harvest may occur. As a special status plant species, effects to individual upland pygmy cypress will be evaluated on a project basis.

**Mushroom Corners**

The Mushroom Corners area partially overlaps the Caspar Experimental Watershed, Russian Gulch/Lower Big River a Late Seral Recruitment area, county roads with visual and recreation concerns, as well as proximity to State Parks and private land ownerships (see Figure 5). In California, there are no fungi species listed as Federal or State Endangered or in the more inclusive Department of Fish and Game, Natural Diversity Database special status lists. A long-beard lichen occurs on JDSF that has been assigned special status by CNDDDB. This area is particularly important to the mycological research community, in part due to its ease of access and presence and abundance of a diverse number of species.

Although the analysis in the December 2005 DEIR did not find any potential adverse environmental impacts to the Mushroom Corners area, it did provide an additional management measure, which is included in Appendix X.

Plant Species of Concern

The following plant and lichen species of concern (Listed species or CNDDDB 1 and 2 status) are currently known to occur on JDSF:

*Arctostaphylos mendocinoensis*, "pygmy manzanita"  
*Astragalus agnicidus*, "Humboldt milkvetch"  
*Campanula californica*, "swamp harebell"  
*Carex californica*, "California sedge"  
*Cupressus goveniana* ssp. *pigmaea*, "pygmy cypress"  
*Lilium maritimum*, "coast lily"  
*Lycopodium clavatum*, "running-pine"  
*Pinus contorta* ssp. *bolanderi* "Bolander's pine"  
*Usnea longissima*, "long-beard lichen"

JDSF will provide site and species specific protection measures that contribute to maintenance or improvement of long-term conservation of population viability of plant species of concern throughout their range.

**Habitat Protection**

- Management activities will be altered (including avoidance of the plant population) if necessary to prevent significant negative effects.
- California Forest Practice Rule protections for wet meadows, springs and other wetland habitats.
- Survey measures discussed below.

**Guidelines for Plant Species Surveys and Avoidance of Significant Impacts**

Rare, threatened, and endangered species, as defined by Section 15380 of the CEQA Guidelines, will be addressed during the scoping, surveying, and mitigation-development processes. For species that do not meet the Section 15380 definitions of a rare, threatened, or endangered species but that are CNPS list 3 or 4 species, evaluation, scoping, and mitigation practices are likely to vary according to identified need, the current state of species knowledge, and consideration of input provided by CDFG through the scoping process.

**Scoping**

The scoping process would normally begin with the identification of sensitive species and their habitats that may be affected by the project and are of management concern. For habitat issues, the scoping process may include habitat issue characteristics, a description of presence in the assessment area, and where potentially impacted, a description of the potential impact, measures to minimize the impacts, and an analysis of significance. For individual species, project-associated risks, limiting factors and current status will be considered. Project specific review may include an evaluation of the availability, quality, and quantity of suitable species habitat within the project and assessment area including an evaluation of known actual or potential presence of the species. To be thorough, the pre-project scoping process will include referencing JDSF plant list from the EIR and current updates, available database information from the California Natural Diversity Database and CNPS Inventory, and other sources of sensitive plant habitat and occurrence data.



**Surveys**

When suitable habitat is present within or immediately adjacent to the project area, project-planning documentation will include surveys as described below, and a discussion of the efforts made to determine presence or absence of the species in question. An assessment area that extends beyond the boundaries of the planned activity may also be required for some species.

For timber harvest plans and other large projects with the potential for negative effects on rare plants, JDSF shall follow the Guidelines for Assessing the Effects of Proposed Projects on Rare, Threatened, and Endangered Plants and Natural Communities (CDFG 2000). On smaller scale projects, the survey effort will be appropriate for the level of CEQA analysis and the risk of impact to rare plants.

Observations of rare, threatened, or endangered plants or plant communities will be recorded on field survey forms and copies provided for the California Natural Diversity Database (CNDDB).

**Mitigation Development**

Upon determination that a proposed action is likely to result in a significant adverse effect, mitigation measures proposed to substantially lessen or avoid the impact will be included in project-associated documentation. Avoidance measures and other necessary mitigations will be specified. Some projects will require consultation with DFG Botanist and an adaptive management approach. An example is conducting invasive weed control and road maintenance in areas with existing or potential Humboldt milk-vetch (*Astragalus agnicidus*) occurrences.

**Improving Knowledge of Rare Plants**

JDSF will provide for, on an as-needed basis, a sensitive plant identification-training program to enhance the knowledge of field personnel that may encounter sensitive plant resources. Personnel who will be responsible for botanical surveys should meet the recommended qualifications for botanical consultants included in the DFG survey guidelines (DFG 2000).

**Species Protection from Invasive Weeds**

The December 2005 DEIR provided an additional management measure related to the protection of rare plants from invasive species, which is included in Appendix X.

**Recreation, Aesthetics, and Public Use**

In accordance with Board of Forestry and Fire Protection policy, recreational facilities will generally be maintained to provide a rustic and informal experience. Existing recreational opportunities and associated management measures (i.e. infrastructure maintenance and improvement) will continue (as described in Chapter 2), and new opportunities will be created. Implementation of the following objectives will facilitate attainment of the Recreation Goals listed in Chapter 1.

**Form a User-Group Recreation Task Force**

JDSF will develop new relationships with the full range of groups who are interested in joint stewardship to enhance the recreational opportunities on the Forest. Staff will solicit representatives from different place-based groups, interest-based groups, recreationalists and schools for participation in a Forest Recreation Task Force or other organized capacity. The intent of the task force will be to share in stewardship, policies and responsibilities regarding recreation on Jackson Demonstration State Forest. Meetings will occur at least annually. Participants may include, but not be limited to: JDSF neighbors, cyclists, equestrians, target shooters, teachers, hunters, hikers, campers, bird watchers, nature photographers, trail guide writers and event organizers.

JDSF will contact leaders of local recreation interest groups to meet as a whole, one or more times during the calendar year, with the following goals:

- Recreation user groups will review recreation policies and plans, and develop survey concepts specific to their interest area. Surveys will provide feedback to JDSF staff on facilities and trails, changes needed to policies and plans, and recreation impacts from planned timber harvest and demonstration projects. Users will provide input on changes needed to address recreation user conflicts, such as conflicts between hunters/shooters and hikers; bicyclists and equestrians; campers and equestrians, etc.
- Recreation user groups will help define a JDSF recreation corridor, particularly around the campgrounds and heavily-used trails, where recreation impacts will be given strong consideration with respect to state forest management activities. User groups will help define recreation attributes that should be protected within the corridor, and make recommendations accordingly, such as
  - Measures to minimize aesthetic visual and noise impacts; and/or
  - Designing timber management activities to improve and/or demonstrate recreation opportunities, principles, or practices.
- User groups will address how to mitigate land adjacency conflicts, such as recreational shooting, off-road vehicle use, and mushroom collecting. User groups will be asked to provide input on how to reduce resource damage from illegal dumping and off-road vehicle use. User groups will be invited to participate in developing and maintaining trails and associated infrastructure such as benches, natural bridges, and erosion control structures.
- Recreation user groups will help develop a recreation calendar for annual planned events. Staff will work with groups interested in docent activities, conducting tours, creating better public awareness, and a developing a recreation-based website.

***Recreation Users Survey***

As described above, the Recreation Task Force will be used to help develop recreation user survey concepts. JDSF will contract with a professional to develop and administer the surveys and to prepare a report of the results and recommendations for how JDSF might respond to the findings. The professional hired will be asked to confer with the Recreation Task Force during this process.

Improve JDSF Recreation Facilities and Information\*

JDSF will inventory trails and schedule repairs and signage needs, update and reprint supplies of trail brochures, maintaining availability at trailheads. Staff will work with recreation user groups to identify need for new trail links, new trail maps specific to user types, and new trail development as needed.

JDSF will update and develop new posters for displays roadside and onsite, which address historic and pre-historic use (Native Americans, etc.) of the Forest, and provide educational and interpretive posters and pictures. In addition, road signage will be improved.

JDSF will update and develop new maps, handouts and brochures for the office foyer, including state forest brochures. *All new brochures will include a statement about how to protect cultural and natural resources on the forest.* Brochures will include (but not be limited to) interpretive trail brochures/maps, handouts on tree ID/ growth characteristics and silviculture information, and handouts on JDSF wildlife, flowers, mushrooms, the Caspar Watershed Study, history of the State Forest, and user-specific recreation maps.

Where businesses express interest, information on recreational opportunities on the Forest will be made available at local and regional sporting goods stores and other places that the interested public might frequent.

The Little Red Schoolhouse, historic site, will be restored and opened to the public (located at Camp 20). Hours of operation will be determined based on the public's interest and availability of volunteers to assist in staffing the building.

Promote Personal Safety and Protect Natural Resources on JDSF

JDSF will recruit and train qualified camphosts to be Volunteers in Prevention (VIPs). Camphost VIPs will continue to issue campfire permits and convey the JDSF recreation goals, purpose, policies, and rules to visitors during the camping season, and to promote a safe and fun camping experience. The two host campsite facilities will be improved to attract more applicants.\* (Currently neither site has electricity or plumbing.)

JDSF will explore the need for new or revised laws and policies as necessary to improve the recreational experience while protecting the environment, historic sites, artifacts, and habitat integrity. Staff will revise permits for campfire, and non-commercial (free) mushroom and campfire wood collection permits as necessary to emphasize the need to protect both cultural and natural resources, including a statement on contacting state forest staff if archaeological sites are discovered, and/or if there are illegal uses or known resource abuses.

JDSF will refine the development of determining recreation carrying capacity for the following recreation-related activities: campgrounds, including rules on parking, number of persons/campsite, outhouse constraints, access points, seasonal wildlife and water quality constraints, trail and road constraints (weight limits and seasonal closures).

(\***Note:** Starred categories may require increased recreation budget allotments for operating and personnel expenses associated with identified tasks).

### Carrying Capacity

Board policy directs that a recreational carrying capacity is to be developed as part of the management plan to guide the development of new campgrounds, picnic areas and trails. Carrying capacities for other recreational uses are not asked for; those other uses either occur primarily on the forest road system (e.g. bicycling, horseback riding, sight-seeing) or are dispersed across the landscape (e.g. mushroom gathering, deer hunting), and are not tied to facilities or improvements specifically developed for recreational activities.

There are several approaches to defining “carrying capacity.”<sup>3</sup> Most focus either on the maximum physical capability of the facilities, or on the level of use that can be sustained without an unacceptable impact on the facilities and on other resources. Carrying capacities can be calculated for existing facilities, and for what might be possible with development of appropriate additional facilities.

The summary table below presents current maximum and sustainable carrying capacities, and potential future sustainable carrying capacities.

**Table 3.5. Recreational Carrying Capacities**

<b>Recreation Use</b>	<b>Maximum Physical</b>	<b>Current</b>	<b>Potential Sustainable</b>	<b>Potential Increase</b>
Campgrounds (camper-days)	120,296	24,059	30,074	6,015
Picnic areas (picnic-days)	45,260	9,052	11,315	2,273
Trails (hiker-days)	186,880	81,030	162,060	81,030

See Appendix VI for specifics of how the carrying capacities were determined.

It is clear from this summary table, that the vast majority of the potential increase that is within the carrying capacity of the forest will involve the increase use and expansion of the day use trail system. Jackson has a wide variety of trail users that range from afternoon hikers, dedicated birders and wildlife watchers, mountain bikers, and horse back riders.

### Management Measures for Recreation

1. Timber harvesting within the 300 feet of campgrounds and day-use areas will be planned and conducted with the designated site use in mind. Main access routes to high-use recreation areas will have slash abatement within 50 feet of the road.
2. Active timber operations within the vicinity (to be discussed at time of sales preparation) of occupied campgrounds and picnic areas will be limited to weekdays and non-holidays. Noise abatement mitigation will be included in any timber sale within 1000 feet of an open campground for timber operations occurring between July 1 and Labor Day. Camp Hosts will be kept informed of activities associated with timber operations affecting campgrounds under their jurisdiction.
3. Road surfacing for heavily used recreational roads will be upgraded in order to limit erosion, protect the beneficial uses of water, and provide safe driving conditions.

<sup>3</sup> Schwarz, C.F., E.C. Thor, and G.H. Elsner  
1976 Wildland planning glossary. General Technical Report PSW-13. USDA Forest Service, Pacific Southwest Forest and Range Experiment Station, Berkeley, California.

4. JDSF will seek joint efforts with the Department of Parks and Recreation and the Mendocino Woodlands Association to manage the area adjacent to the Mendocino Woodlands Outdoor Center for educational and recreational purposes.
5. Recreation facilities such as trails and roads used for recreation also are addressed in the FMP by their inclusion in the Road and Trail Corridor Special Concern Area.

#### Mitigations to Avoid Potential Recreation and Visual Impacts

- a. For even-aged timber harvest plans or harvest plans adjacent to buffer areas, conduct field evaluations by a RPF or his or her designee to determine the visibility of the THP area to the Forest visitor as seen from roads, trails, and recreation areas. Evaluations will include, but not be limited to: the degree and duration of vistas and general topography of the THP area in relation to the view aspect, and type and density of forest canopy and understory cover of forest areas surrounding the THP area. Where appropriate to visually soften and mitigate impacts created by even-aged management on the integrity of scenic views visible to the general forest visitor, develop the THP to include one or a combination of the following: modify the configuration of the harvest area to better reflect topography; modify the configuration of the harvest area to avoid spanning ridgelines in whole or in part; or leave selected standing trees along the harvest edge boundaries.
- b. For public safety, post and maintain signs around all areas closed to public access for timber operations that includes information defining the period of closure. In order to avoid conflicts between recreation uses and for public safety, post and maintain appropriate signs around all areas closed to hunting, trapping, and the use of firearms. Signs should be posted at all points where roads and trails enter such areas and, in the case of hunting restrictions, at legally required intervals along the perimeter of such areas.
- c. Other recreation facilities such as trails and roads used for recreation are addressed in the FMP by their inclusion in the Road and Trail Corridor Special Concern Area.

The December 2005 DEIR provided several mitigations to avoid potential significant adverse recreation or visual impacts which have been included here and in Appendix X.

## **Forest Protection**

### Fire Protection

The Mendocino Unit Chief is responsible for fire protection in the State Forest. The Forest Manager, the Operations Officer, the Fire Prevention Battalion Chief, and the local CDF Battalion Chief will work together to ensure an adequate fire protection program is in place for JDSF. In addition, the State Forest staff will work with other agencies, adjoining landowners, and timber sale purchasers as needed to provide a comprehensive fire protection program for the State Forest.

### **Pre-suppression**

Pre-suppression is defined as fire protection activities performed before fire occurrence to ensure effective fire prevention and suppression. Pre-suppression plans discuss site-specific ways to

minimize loss and reduce fire hazard and risk. The local CDF Battalion Chief will be requested to update the current pre-suppression plan for JDSF with assistance from the Forest Manager and the Fire Prevention Battalion Chief. The more comprehensive plan will include definitions and assessments of high risk and hazard areas, maps of fire defense improvements, descriptions of prevention techniques, and an evaluation of available resources. This plan will also identify potential locations for incident camps in the event of a large extended attack fire.

### **Fire History**

Establishing the known fire history is an important part of any pre-suppression plan. A fire history helps to identify the risk of natural or human-caused fire over any given time period, and provides a better understanding of the forest ecosystem as it currently exists. A complete and current fire history for the State Forest is partially complete. The local CDF Battalion Chief and Forest Staff will be encouraged to continue to update the fire history as more information becomes available. Sources of information may include prehistoric (fire scars and the use of dendrochronology) and historic (fire reports) records.

### **Fire Defense Improvements**

Where installed, fire defense improvements will be strategically located to protect forestland and neighboring properties. Improvements in the State Forest include water tanks, water sources, shaded fuel breaks, and helispot locations. The water sources and tanks will be positioned so that water will be available during a fire emergency. In addition, appropriate road signing, fire hazard reduction, and adequate access to roads and trails will be added or maintained. Fire hazard and prevention information as well as Forest regulations will be posted on information boards. The day-use areas, campgrounds, and picnic areas will be treated as necessary to reduce fire hazards for safety and demonstration purposes. The major roads and trails in the Forest are in the process of being maintained to provide access for fire protection purposes. A system of road signing will assist fire control personnel in finding key locations when prompt action is required.

A system of shaded fuelbreaks will be considered for construction in the State Forest with the help of crews from the Parlin Fork and Chamberlain Creek Conservation Camps. These fuelbreaks serve as preplanned fire control lines when a wildfire escapes initial attack. They will be constructed in defensible areas along main ridges, adjacent to high-use roads, and adjacent to rural residential neighborhoods. Appropriate project-level CEQA analysis will be conducted for fuel break construction.

A program to locate archeological and other sites requiring special protection measures will be established for shaded fuelbreak areas since these areas will likely be subject to heavy equipment operations during an emergency wildfire situation. A preplanned approach to special resource sites can often make a difference with regards to their protection when prompt action is required to protect lives, property, and the environment during fire fighting operations.

A system of helispots with forest road access will be established for fire suppression and medical evacuation operations.

### **Regulations**

Potential ignition sources such as campfires and smoking are controlled on the Forest. Campfires are restricted to developed fire pits within campgrounds. Smoking is only allowed in areas sufficiently cleared of light fuels.

The period of high fire danger generally occurs between July and November, though this period may be extended by severe weather conditions. The Forest Manager will coordinate with the Operations Officer to determine necessary actions to be employed. The steps may include increasing patrols of the Forest, posting alert signs, providing more fire prevention information and awareness of current conditions to Forest visitors, and reducing activity in the Forest by closing specific areas.

**Education**

JDSF will coordinate with the Fire Prevention staff for educational purposes. Educational information will be encouraged in an attempt to prevent human-caused fires within the State Forest. Target groups may include neighbors, visitors, timber operators, school groups, and local organizations. Appropriate fire safety information will be included in informational brochures about the Forest and its recreation opportunities.

**Enforcement**

Forest patrol is an important element of fire prevention and fire protection. JDSF staff will coordinate with Fire Prevention staff for patrol purposes. Patrols will include public contact, fire detection, and movement along forest roads during the fire season.

**Suppression**

Suppression tactics are based on the pre-suppression plan. JDSF staff will support fire control personnel by taking direct actions to control wildfire and by providing local expertise regarding road conditions, vegetation, cultural, wildlife, and watershed resources. The staff may also evacuate visitors, close the fire area, perform law enforcement tasks, and assist with delivery of information as appropriate.

**Detection**

Detection strategies include patrol, searching for evidence of fires, and patrol flights during extreme fire danger periods or after lightning storms. JDSF participates in a cooperative air patrol program. The Unit's Emergency Command Center personnel routinely check the Automatic Lightning Detection System for possible strikes in the Forest.

**Communication**

As part of communication, CDF will maintain an adequate radio system and stay in close contact with local fire departments. Local CDF fire control personnel will remain familiar with the pre-suppression plan for the State Forest.

CDF's resource tracking system will be used to dispatch the appropriate personnel and equipment to any fires on JDSF. The State Forest is a defined response area.

**Post-suppression**

Post-suppression activities include the evaluation of pre-suppression information, suppression actions, and rehabilitation needs. Rehabilitation involves erosion control and other restoration activities. Unit personnel will evaluate post-suppression activities on an individual fire basis.

To minimize increases in wildfire risks resulting from increased public use in the Forest, CDF will record and compile descriptions of all wildfires occurring within JDSF. If an increase in wildfire frequency occurs, appropriate measures will be implemented as needed to reduce wildfire risk.

### **Prescribed Fire**

Fire is a natural ecosystem process within the coast redwood forest type. Fire exclusion over the long run is not possible and may not be desirable in maintaining natural ecosystem processes. However, forest structure and fuel loading have been altered by long-standing fire suppression policies. There is potential for use of JDSF as an area for site-specific research in the use of fire as a management tool. The use of fire can facilitate fire hazard reduction, silvicultural and habitat research, and ecosystem management research. A prescribed fire program that involves these objectives will be considered for JDSF as resources allow.

### Law Enforcement

State law requires CDF to protect the State Forest “from damage and to preserve the peace therein.” The Mendocino Unit Chief is responsible for the enforcement of state law on the State Forest. The Forest Manager, the Fire Prevention Battalion Chief, and the local CDF Battalion Chief will work together to ensure that all relevant state laws are properly enforced. CDF will continue to employ peace officers that are dedicated to enforcing state laws on the State Forest. There are a number of laws that are specific to the state forest system that address camping, campfire permits, noise, firearm use, firewood, rubbish dumping, smoking, and the protection of archeological features.

### Forest Pest Management

Forest pests such as insects, diseases, and vertebrates have long been established in California's native timberlands. Populations of pests are dynamic and fluctuate in response to climatic and environmental changes such as drought, forest stocking, windthrow, fire, and other site disturbances. The effects of pests may reduce tree growth, affect species composition, or impact forest stocking. At the same time, other forest resources, such as wildlife habitat, may be impacted by the change in forest structure brought upon by excessive tree mortality. Integrated forest pest management provides a means to address these issues.

The intent of integrated pest management (IPM) is to prevent or suppress forest pest problems with population suppression and the minimization of factors that predispose trees to infestation. IPM makes use of the benefits of cultural, mechanical, chemical, semi-chemical (e.g. synthetic pheromones), and biological pest management alternatives.

Pests known to have caused tree mortality within or adjacent to JDSF are listed in Table 3.6. There may be other pests of local tree species that are seldom detected or reported.



**Table 3.6. Common Forest Pests on JDSF**

<i>(also Table DEIR VII.6.4.1.)</i> <b>Common Forest Pests on Jdsf.<sup>1</sup></b>					
<b>Diseases</b>	<b>Douglas-Fir</b>	<b>Grand Fir</b>	<b>Mendocino Cypress</b>	<b>Western Hemlock</b>	<b>Redwood</b>
<i>Heterobasidion annosum</i> Annosus Root Disease	X	X			
<i>Armillaria mellea</i> Armillaria Root Disease	X	X	X	X	X
<i>Leptographium wageneri</i> var. <i>pseudotsugae</i> Black Stain Root Disease	X				
<i>Phaeolus schweinitzii</i> Velvet Top Fungus	X				
<i>Phellinus pini</i> White Pocket Rot	X	X			
<b>Insects</b>					
<i>Melanophila drummondi</i> Flathead Fir Borer	X				
<i>Dendroctonus pseudotsugae</i> Douglas-fir Bark Beetle	X				
<i>Scolytus unispinosus</i> Douglas-fir Engraver Beetle	X				
<i>Pseudohylesinus nebulosus</i> Douglas-fir Pole Beetle	X				
<i>Scolytus ventralis</i> Fir Engraver Beetle		X			
<i>Pseudohylesinus seriaceus</i> Silver Fir Beetle	X	X			
<i>Phloeosinus sequoiae</i> Redwood Bark Beetle					X
<b>Vertebrates</b>					
(several species suspected) <sup>2</sup> Tree squirrel(s) (upper stem girdling)					X
<i>Odocoileus hemionus</i> <sup>3</sup> blacktail deer (seedling/sapling browsing damage)	X	X	X	X	X
<i>Neotoma fuscipes</i> dusky-footed woodrat (girdling of branches and top)					X
<sup>1</sup> Robinson, 1993. <sup>2</sup> Marshall, 2002. <sup>3</sup> Assumption based upon general knowledge (not documented in the original table).					

State Forest staff will continue to monitor the Forest for early signs of forest pests or conditions that may lead to infestation. JDSF will also assist the pest-monitoring program of the California Department of Food and Agriculture by allowing deployment and inspection of gypsy moth traps in high use areas of the Forest.

Other efforts to reduce pest damage or predisposition will include:

- The minimization of injuries to residual trees during forest management activities.

- Reuse of old skid trails where available to reduce soil compaction.
- Retention of a diverse species composition in or adjacent to stands following forest management activities and within or nearby future regeneration units.
- Avoidance of non-native tree species that may be predisposed to pests with few local pest predators and parasites.
- Use of CDF or other forest pest management specialists to train employees in forest pest recognition and management.

### Sudden Oak Death

#### ***California Code of Regulations--The Oak Mortality Regulation, as Applied to State Lands.***

JDSF is within the declared SOD Zone of Infestation established by the California State Board of Forestry and Fire Protection and is within the “regulated area” for SOD as designated by the California Department of Food and Agriculture. The Zone and regulated area are identical and cover all portions of the fourteen infested counties identified in the California Department of Food and Agriculture (CDFA) Section 3700 regulation (refer to the list of counties presented below, “Regulated Area”).

Federal regulations from the USDA-APHIS, and state regulations from CDFA address SOD concerns. CDFA regulations limiting the movement of host materials apply to forest management activities on JDSF including timber harvest, timber stand improvement activities, and harvest of minor forest products. Under the state regulation, host material cannot be transported from the regulated area unless accompanied by a compliance agreement. The Forest Practice Rules (FPRs) do not specifically address SOD. However wherever a Zone of Infestation applies, the FPRs [14 CCR 917.9(a)] require that mitigations be included in Timber Harvesting Plans (THPs) to prevent the spread of the infestation. The following section includes a discussion of the applicable regulations, descriptions of host material, the “free-from” protocol, what constitutes a “compliance agreement,” and mitigation measures to prevent the spread of SOD.

A federal quarantine for *P. ramorum* was issued as an interim rule by USDA -APHIS on February 14, 2002. For more information on the Federal rule see <http://www.aphis.usda.gov/ppq/ispm/sod/>.

***Host Material, The Oak Mortality Regulation.*** This is a California state law (Section 3700 in Title 3 of the Code of Regulations). The law defines the regulated articles (plants or plant parts) and commodities (unprocessed wood, wood products, and any other product, article, or conveyance presenting a risk of spreading the pathogen). On CDFA’s regulatory web page, with a link to APHIS’ updated (January 10, 2005) host list, 31 proven hosts and 37 associated plants (nursery stock) are now regulated as either entire plants or specific plant parts thereof. To review this list and keep abreast of updates, consult CDFA’s web site at <http://pi.cdfa.ca.gov/pqm/manual/htm/455.htm>.

Based upon currently available information, CDFA, the County Agricultural Commissioners, USDA Forest Service, and CDF have ranked the regulated articles according to their potential for transport of *P. ramorum* and believe that the highest risk for transport is from nursery stock of host species, followed by green waste, then firewood and logs. Lumber and manufactured wood products are not considered a risk for transport of *P. ramorum*. Soil is not included in California’s regulations, but is in the federal regulations. The enforcement rules are strictest for the highest risk regulated articles. Green waste is considered higher risk than firewood because the pathogen sporulates readily on leaves from tanoak, rhododendron, bay, and some other hosts. However, sporulation is rare on wood.

On JDSF, host material that is likely to be transported may consist of logs from host species produced as part of a harvest plan. In addition, there is the potential for minor forest products such as salvage sawlogs, firewood, and greenery to be moved from the regulated area.

Trained JDSF personnel will submit samples of symptomatic hosts and non-hosts to CDFA for confirmation of pathogen in new areas or on new hosts. As new hosts are confirmed by CDFA, the entire plant or specific portions thereof are amended to the rules as regulated articles. CDFA currently recognizes only RPFs, government agency personnel, and others that have been approved to attend specific CDFA-certified COMTF training as "official samplers." CDFA will use the training session attendance roster as a list of official samplers.

Only an official sampler can complete a free-from survey as discussed below. The completed free-from survey, if part of an approved THP, will allow the plan to serve as a compliance agreement for a period of one year.

**Regulated Area:** As of May 1, 2005, regulated counties are Alameda, Contra Costa, Humboldt, Lake, Marin, Mendocino, Monterey, Napa, San Mateo, San Francisco, Santa Clara, Santa Cruz, Solano, and Sonoma.

**Distribution of SOD:** Check the website <http://www.cnr.berkeley.edu/comtf/> for known infested areas. Information on local distribution may also be obtained from the County Agricultural Commissioner's office or CDF.

**State Regulation:** SOD can spread via host material. Therefore, plants, plant parts, unprocessed wood and wood products, and other products of the above mentioned hosts cannot be moved from counties infested with SOD without authorization by the County Agricultural Commissioner or CDF's and USDA Forest Service's harvest document approval process. The term "harvest document" refers to any document filed with the California Department of Forestry and Fire Protection that authorizes the removal of forest products for commercial purposes.

See <http://pi.cdfa.ca.gov/pgm/manual/htm/455.htm> for California Department of Food and Agriculture's (CDFA) regulations regarding commodities covered and restrictions of their movement.

**Compliance Agreement.** A compliance agreement is required to move regulated articles of host material from the regulated area. A compliance agreement may be obtained through the County Agricultural Commissioner's office. An inspector will complete an inspection and make a determination that all the regulations are understood, that compliance with the regulations will be achieved and that all provisions of the compliance agreement will be carried out. Once a landowner and USDA-APHIS sign a compliance agreement, the regulated host material may be moved interstate as stipulated in the compliance agreement. A compliance agreement consisting of a free-from certification is only valid in California, as APHIS does not have allowance for free-from surveys in its regulations. A THP or other "harvest document" approved by CDF may also serve as a compliance agreement. An approved harvest plan without a free-from survey, but with approved SOD mitigation covering known hosts will allow transport of host material from the regulated area. Approved plans with an incorporated free-from survey may act as a compliance agreement for a one-year period from the date of a documented negative result survey, or one year from the date of a negative reply from CDFA to samples of symptomatic hosts.

**Free-from Protocol.** A *P. ramorum* "free-from" survey is a survey of land with host trees or shrubs that is done to determine if *P. ramorum* is present in the area in which a commercial operation will be conducted. All survey results are good for one year, unless symptomatic hosts are observed during that year. Transects would be run designed to cover representative areas of known SOD hosts. Transect width is variable to allow for adequate inspection. The official sampler must look for symptoms on all hosts along transects (also as approaching site, etc.). CDFA's sampling protocol is to be used to confirm *P. ramorum* in the laboratory. Since the survey is to determine presence or absence, if many symptomatic trees/shrubs are found, the survey may be stopped to wait for lab results. However, if *P. ramorum* is not found, the survey will need to be completed for the entire area.

***The State of California Enforcement Rules to Prevent Spread of SOD***

The restrictions established by the California Enforcement Rules to Prevent Spread of SOD are summarized in Table 3.7 (December 2005, DEIR Table VII.6.4.4). There are no applicable state regulations if host material from JDSF remains within the regulated area. Therefore, the following table lists regulations applicable for host material moving from the regulated area, but remaining within California.

<b>Table 3.7 Summary Of Sudden Oak Death Woody Material Rules Under State Regulations.</b>
Regulated articles and commodities may move from the regulated area to other parts of California if accompanied by a compliance agreement affirming the articles or commodities meet the restrictions outlines in the CDFA regulations.
Compliance agreements are issued by the local Agricultural Commissioner. Approved THPs may serve as an equivalent substitute.
Compliance agreements are valid for one year.
A "free-from" survey with negative findings can act as a compliance agreement.
If <b>regulated stems (logs and firewood) are debarked</b> , a compliance agreement is not needed and material is free to move.
If host <b>stems (logs and firewood) are not debarked</b> , a compliance agreement is needed affirming the articles have been appropriately treated.

***Host material less than 4" in diameter (green waste and some special forest products, except fruits, berries and acorns).*** Host material from within the regulated area and smaller than four inches in diameter may move anywhere within the regulated counties. For shipment beyond the regulated counties, the site must be either surveyed and determined "free-from" and accompanied by a permit/compliance agreement, or debarked. The compliance agreement will be issued by the responsible agency (CDF or County) having jurisdiction. It is recommended that materials be taken to an approved treatment or disposal facility (i.e., cogeneration plant or compost facility), if available. Under special arrangement, infected host material may be allowed to move to an approved cogeneration facility if transported and handled according to specifics of a compliance agreement. Host material smaller than four inches in diameter, including chipped and shredded host material, shall be safeguarded during transport (such as in secured plastic bags, closed containers, or covered by a tarpaulin in such a manner that precludes the escape of any material), and otherwise handled as specified in the compliance agreement.

***Restrictions on firewood and logs (host woody material greater than 4" in diameter).***

Firewood and logs may move from the regulated counties if accompanied by a permit/compliance agreement. The permit will be issued by the responsible agency having jurisdiction if the regulated articles have been grown on a site surveyed and determined "free-from." Regulated stems, moving as logs or firewood, do not need a compliance agreement if debarked.

***Firewood sales on State forest lands.*** Firewood sales for host material will not be permitted in areas with confirmed cases of sudden oak death (*P. ramorum*). Personnel setting up firewood sales must know how to recognize symptoms of *P. ramorum*. They should use the "free-from" protocol to determine if *P. ramorum* is present in the proposed firewood sale area. If *P. ramorum* is not detected in the "free-from" survey, the operation is set up as usual with no further regulation for a period of

one year. For firewood permits, a provision will be added to the permit explaining the current regulations, and that compliance is required.

On State Forest lands, where the public is required to have a permit to collect firewood, CDF shall use this public contact to educate the person(s) about sudden oak death by providing a Pest Alert or other information on sudden oak death along with the firewood permit.

**For Timber Harvesting Plans.** If host material is to be moved intrastate from the regulated area, one of three procedures shall be followed:

1. A survey to determine the area is "free-from" *P. ramorum* is completed by Registered Professional Foresters (RPFs) or other official sampler. Symptoms of *P. ramorum* will be surveyed for during the timber cruise or pre-sale layout done to develop the Timber Harvesting Plan. If no *P. ramorum* is detected, the survey design and results may be incorporated into the plan. If the one-year free-from period expires prior to or during timber operations, a new free-from survey must be conducted and amended to the plan. Or,
2. If a free-from survey results in positive SOD finds, mitigation measures shall be written into the plan. At a minimum, mitigations shall include current regulations. In support of 14 CCR 917.9, the RPF is encouraged to add additional measures or Best Management Practices to limit the spread or build-up. Or,
3. In lieu of a free-from survey, the RPF may assume that all known SOD hosts found on the plan area are infected and required and appropriate mitigation measures shall be incorporated.

**FPR compliance:** Pursuant to 14 CCR 917.9(a) for commercial harvest subject to the California Forest Practice Rules, and within the declared Zone of Infestation, the plans must identify feasible measures to mitigate adverse infestation or infection impacts during timber operations (PRC 4527).

#### **Federal (APHIS) Enforcement Rules to Prevent Spread of SOD**

Regulated articles may be transported interstate from the regulated area only if accompanied by a certificate/compliance agreement which verifies the regulated articles have been treated according to measures in the federal register. Acceptable treatments are:

1. Wood products such as firewood, logs, or lumber must be free of bark.
2. Soil (nursery industry) that has not been in contact with SOD-infected hosts and is free of duff, or soil which has been heat-treated at 180F for 30 minutes.
3. Wreaths, garlands, and greenery dipped for one hour in water held at 160F. Bay leaves used in wreaths also may be vacuum/heat treated.
4. Green waste may move to energy generation facilities under limited permits issued by the local Agricultural Commissioner.

#### **Pitch Canker**

JDSF staff will incorporate the most current best management practices as identified by the California Pitch Canker Task Force for controlling the distribution and spread of Pitch Canker. The following measures are the most current as of December 1, 2006:

Management practices to be applied should pitch canker be identified on JDSF lands

- a. The timely removal and disposal of trees dying from pitch canker may help prevent the buildup of destructive beetles which can attack other trees, and can carry the pitch canker pathogen to uninfected trees. The disposal of pitch canker diseased material should be done on-site so as not to spread the disease to uninfested areas. Limbs and small pieces of wood may be left on-site or they may be chipped or burned. Logs cut from pitch canker diseased trees may be split for firewood for local use, but infected logs shall first have the stem cankered sections bucked from them. The remaining wood should be seasoned beneath a tightly sealed, clear plastic tarp to prevent the buildup of destructive insects. California Department of Forestry and Fire Protection Tree Note #3, Controlling Bark Beetles in Wood Residue and Firewood, provides specific guidelines for placing tarps over and around firewood. Do not stack pine firewood next to living pine trees or transport it to uninfested areas (Sanford, 1996).
- b. The distribution of the disease is discontinuous; thus, there are infested as well as uninfested areas within the Zone of Infestation (at the time this document was prepared, pitch canker was not known to occur on JDSF). The Pitch Canker Task Force of the California Forest Pest Council and CDF have ongoing monitoring underway for the disease. JDSF staff should report any symptomatic Bishop pines to the Task Force for determination of presence of pitch canker. CDF and the Mendocino County Agricultural Commissioner shall be notified immediately in the event that pitch canker is found on JDSF.
- c. Directions for Registered Professional Foresters and Licensed Timber Operators:
  - ° Know when you are working within an infested area.
  - ° The California Department of Forestry and Fire Protection (CDF) has the authority to impose conditions on the commercial harvest of trees from timberland within the Zone of Infestation. Such actions are to be carried out on a case-by-case basis and depend upon the harvest operation's potential to contribute to disease spread. For all timber operations regulated by the Department, the Department must be informed if pitch canker is present within the operating area.
  - ° Do not transport infected or contaminated material to areas that are free of the disease.
  - ° When cutting or pruning a diseased tree, clean tools with a disinfectant before using them in uninfested areas. Lysol® is an effective sterilizer. Make sure that clients and co-workers are aware of these guidelines (Pitch Canker Task Force, 2000a).
- d. Directions for Firewood Cutters:
  - ° JDSF personnel should be kept informed whether pitch canker is determined to be present on the Forest. Any suspect areas shall be avoided for firewood harvest until an official determination is made as to presence or not of the disease. At time of firewood permit issuance, JDSF personnel shall direct firewood cutters to disease free areas of the Forest. Information on pitch canker disease recognition and regulations shall be provided with the collection permit in the event pitch canker becomes present on the Forest.
  - ° Tools and machinery that are to cut trees with pitch canker disease WILL BECOME CONTAMINATED with the pitch canker fungus. There is little chance of spreading pitch canker if contaminated tools are only used on dead trees or on trees that are not pines. However, if contaminated tools or machinery will be used on living pines, the tools should be cleaned and sterilized before use on uninfected trees or in uninfested areas. Lysol® is a suitable sterilizer for this purpose. A logical alternative to repeated cleaning of

equipment is to reserve one set of equipment for use only in infested areas, and another set for use only in uninfested areas.

- ° Do not transport pine firewood out of infested counties (Mendocino County is an infested county). Sell pine firewood locally using local use guidelines (Pitch Canker Task Force, 2000a).

e. Directions for Other Forest Product Harvesters:

- ° JDSF personnel, at time of collecting permit issuance shall direct collectors to disease-free areas of the Forest. Information on pitch canker disease recognition and regulations shall be provided with the collection permit.
- ° Collectors shall not be permitted to remove pine products from trees infested with pitch canker disease.

f. Directions for Reforestation in Areas Affected by Pitch Canker:

- ° Material for replanting should be as local in origin as possible to retain the genetic integrity of the local population (Pitch Canker Task Force, 2000b).
- ° Option 1. The preferred strategy for reestablishing Bishop pine would be to allow natural regeneration to occur. Site improvement to encourage regeneration may be required where a dense overstory precludes the development of a seedling stand. Where natural regeneration does occur, it can be expected that pitch canker will eventually infect some or most of the young trees. However, the trees will vary in their susceptibility and some may sustain little or no damage. This is the least intrusive approach to reforestation, with the possibility that a level of pitch canker resistance will be attained that eventually provides the desired density of mature trees (Pitch Canker Task Force, 2000b).
- ° Option 2. If option one is acceptable in principle but there is insufficient seed to produce a stand, locally collected seed could be introduced. By collecting seed from asymptomatic trees, there is more likelihood that some are resistant, and a certain percentage of the progeny will carry this trait as well. It is thought that a small percentage of resistant individuals may be sufficient to establish a stand. To diversify the seed source, it is recommended that seed be gathered from: (1) multiple trees, at least 100 meters apart where possible, (2) trees of differing ages, and (3) different heights within the same tree. Trees that have been planted should be avoided, as they may be non-local in origin. In addition, trees with evidence of disease, especially western gall rust, should not be used as a seed source (Pitch Canker Task Force, 2000b).
- ° Option 3. The least desirable measure for maintaining Bishop pine presence is to transplant known resistant seedlings from a reputable source. The potential loss of genetic integrity could result in a nonnative stand (Pitch Canker Task Force, 2000b).

## **Data and Information Management**

Data and information management are addressed to a substantial extent in Chapter 4 Research and Demonstration.

Two independent forest resources inventory efforts continue to be maintained at JDSF. The Continuous Forest Inventory (CFI) consists of 142 permanently monumented plots with individually tagged trees. The plots were established in 1959 and have been measured at five-year intervals since they were established. This information has been periodically collected for more than 40 years, and has been extensively reviewed and utilized by researchers and professionals. The primary purpose of the CFI is to provide information on changes in resource conditions over time for planning, monitoring and adaptive management purposes. The CFI inventory system has changed several times over its almost 50-year life span, and continues to evolve in response to changing priorities and advances in forest inventory techniques and knowledge. The Forest Resources Inventory (FRI) consists of periodic installation of a large number of temporary plots (5,000 plots in 2005). The primary purpose of the FRI is to provide detailed information on resource conditions across the Forest at one point in time. The two inventory systems complement each other and provide periodic detailed point-in-time resource conditions at a high level of detail as well as changes in resource conditions over time. The inventory system at JDSF was designed to provide maximum information at the optimal cost of sampling effort.

The CFI and FRI inventory systems on JDSF provide a rich legacy database of resource conditions for research and application. In an effort to further improve on the resource inventories at JDSF in the face of expanding scope of data needs for other resources than trees, CDF is developing a contract with independent third-party experts to provide a review of forest inventory approaches on JDSF, as well as the other Demonstration State Forests.

## **Budget and Staffing**

### Recent Augmentations

The State Forest budget and staffing were increased during the 06/07 fiscal year. This added needed resources, including several foresters, a wildlife biologist, an archaeologist, and a heavy equipment operator. Some of these positions will be filled during the fiscal year, while others will be filled during the coming fiscal year, as revenues are produced.

Budget augmentation will include funding for road management, research and demonstration, timber stand improvement, and general operating expense.

### Additional Staffing Benefits

In assessing needs for the coming decade, greater biological expertise appears to be a high priority. Expertise in fisheries would augment the current wildlife biologist position. Additional expertise in geology, botany, hydrology, and ecology would also be of value. It is recognized that existing staff can be trained to perform many of these functions at a significant level, depending



upon individual aptitude, education, and training. Additional staff dedicated to public education and recreation is also needed.

As general administration complexity increases, additional staffing in finance, personnel, contracting, and grant processes would be beneficial, increasing the effectiveness of the state forest program.

#### Research Funds

A significant portion of the research funds allocated to the state forest system are administered by Sacramento headquarters staff. A substantial increase in the level of available funding would be of value, considering the state and regional need for forest management research.

### **Property Configuration**

The ability to conduct meaningful research and demonstration work in the context of forest management makes it desirable to control entire watersheds, thus reducing the potential for manmade influences or natural influences that cannot be examined or are beyond the control of management.

#### Purchase of In-holdings

It would be beneficial for the Forest boundaries to extend to natural watershed divides, and to incorporate existing in-holdings. Currently, the Forest is fairly contiguous, with a few minor in-holdings and adjacent properties that narrow the Forest boundaries. The principal adjacent properties considered most desirable for incorporation into the Forest include the McGuire Ranch (currently owned by Soper-Wheeler Company and The Conservation Fund) in the Upper South Fork Noyo area, and a string of 40-acre parcels located in James Creek (currently owned by Coastal Ridges LLC).

#### Expansion Through Acquisition

Expansion of the Forest to take in the upper watershed areas of James Creek and the North Fork Big River (Coastal Ridges LLC) would round out the Forest to the east, and incorporate some ecosystems that are currently absent from JDSF (e.g. large boulder out-crop, natural prairie, oak woodland, Douglas fir forest). A lesser priority area would include the upper watershed area of the Little North Fork Big River (The Conservation Fund). The principal value in adding the Little North Fork Big River area is proximity to the Mendocino Woodlands Outdoor Center for public educational and demonstrational purposes.

Of the areas identified, only the previous owners of the Coastal Ridges LLC property have been approached by the State to discuss potential acquisition. The other landowners have not been approached, nor have they come forward with a proposal. Their desires are unknown at this time.

#### Boundary Line Adjustments and Trades

Other minor property boundary changes could conceivably be accomplished by adjusting boundaries with adjoining timber companies to move boundaries to ridge-lines. These areas include Riley Ridge (between SF Noyo and Noyo River), Three Chop Ridge (between Big River

and Noyo River), and various locations along the southern boundary of the Forest. Some of these boundary adjustments could be accomplished through land and timber trades with adjacent owners.

A boundary line adjustment or purchase with particularly beneficial potential is Three Chop Ridge, incorporating the Three Chop Ridge Road to its intersection with Highway 20. This would provide the state with control of a major fire suppression ridge and provide a significantly shorter and safer route to Highway 20 for public and administrative traffic between parts of JDSF, the main Noyo River drainage, the San Francisco Boys and Girls Club, and the Camp Noyo Boy Scouts Camp. Much of this traffic currently uses JDSF Road 200, which is a viable candidate for decommissioning, due to its somewhat hazardous and potentially damaging inner gorge location.